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Analyzing Fancy Cotton Fabric

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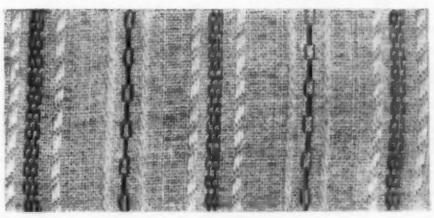


Fig. 1. Fabric Analyzed

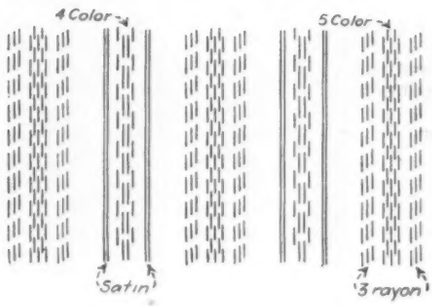


Fig. 2. Sketch of Stripes

By Clarence Taggart

ALTHOUGH the reproduction of cloth from woven samples is common and every-day work for the mill designer or weaving overseer, there are so many different cloths that it is hard to say which system of analysis is the best to follow. Of course every mill has some individual peculiarity or condition which necessitates a system different from that of other mills, but the system explained herein is very simple and could be applied under almost any conditions.

In the average mill, swatches are received daily on which it is required that costs be determined and samples be woven. A simple and comprehensive system is necessary. Any system if followed daily will become a habit, and therefore a good sound system should be practiced as early as possible.

Procedure Advised

Upon receiving a piece of cloth for analysis, the following procedure is advisable:

1. Determine as near as possible ground sley and pick.

2. Count the number of ends in each stripe, beginning with the largest ground stripe and working from right to left until a full repeat of the pattern is covered.

3. Decide on what sley reed is to be used.

4. Find number of dents each stripe occupies.

5. Prove layout plan.

6. Find the number of patterns in the width of the cloth.

7. Rearrange the layout plan to indicate start and finish for drawing-in.

8. Figure the total ends of each different warp and total number of dents required.

9. If necessary, pick out details of weave.

10. Put harness numbers under details of weave.

11. Make drawing-in draft.

12. Select from harness draft the numbers which are to cut.

13. Make chain draft and be sure every harness cuts.

14. Figure the number of heddles for each shaft.

15. Figure weight of each material, percentage of each material, and yards per pound.

Illustrative Example

To correctly illustrate the system, complete analysis of the piece of cloth illustrated in Figs. 1 and 2, is described.

1. The ground sley is 72x60. The sley in unequally reeded fabrics can be determined by measuring the stripes by a 100ths rule, multiplying the number of ends counted by 100, and dividing the result by the number of 1/100th parts they measure. The number obtained is the sley.

2. Number of ends in stripes:

18 Gray
3 Rayon and 2 Gray
6 Gray
5 Color and 4 Gray
6 Gray
3 Rayon and 2 Gray
18 Gray
4 Gray
4 Gray
4 Color and 4 Gray
4 Gray
4 Gray.

3. Sley reed: The cloth width of 36 in. x 72 sley equals 2592 ends. Reed width equals 36 in. plus 7% for contraction, or 38.50 in. The total ends, 2592, divided by 2 ends per dent equals 1296 dents. 1296 dents divided by 38.50 in. equals 33.66 dents per inch.

4. Number of dents each stripe occupies:

Rayon	Color	Gray	Dents
..	..	18	9
3	..	2	1
..	..	6	3
..	5	4	2
..	..	6	3
3	..	2	1
..	..	18	9
..	..	4	1
..	..	4	2
..	4	4	2
..	..	4	2
..	..	4	1
6	9	76	36

The number of dents a stripe occupies can also be determined by the 100ths rule.

5. Prove layout plan: The layout plan

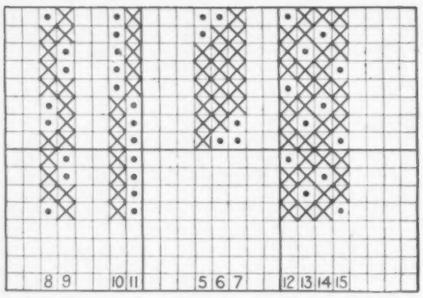


Fig. 3. Details of Weave

shows the numbers of ends and the dents occupied (see 4). To prove, count the fulll number of ends in one pattern of each different yarn in the cloth and compare with the totals in the layout plan. Measure the width of one pattern and compare with the total number of dents in the layout plan.

6. Number of patterns in cloth width: 1296 dents less 16 dents for the selvage equals 1280 dents. 1280 divided by 36 dents in one pattern equals 35 full patterns and 20 dents over.

7. Rearrange layout plan to indicate start and finish for drawing-in:

Rayon	Color	Gray	Dents
..	..	12	6
..	..	4	1
..	..	4	2
..	4	4	2
..	..	4	2
..	..	4	1
..	..	12	6
..	..	6	3
3	..	2	1
..	..	6	3
..	5	4	2
..	..	6	3
3	..	2	1
..	..	6	3
6	9	76	36

This is rearranged to make the drawing-in simple and to obtain the same width of stripe next to each selvage.

8. Total number of ends and dents:

Rayon	Color	Gray	Dents
6	9	76	36 (one pattern)
..	..	..	35 (full patterns)
210	315	2660	1260
..	4	44	20*
..	..	64	16†
210	319	2768	1296

*(1st 20 dents in layout plan)
†(selvages).

9 and 10. Details of Weave: See Fig. 3.

11. Drawing-in draft: See Fig. 4.

12. Select cutting numbers: 1 and 15, 12 and 4.

13. Make chain draft: The nature of the weave does not allow the colored or rayon stripes to cut. The satin strip is made to cut on both sides. See Fig. 5.

14. Number of Heddles:

15	72
14	72
13	72
12	72
11	72
10	72
9	105
8	70
7	70
6	70
5	70
4	612
3	612
2	612
1	612

This is obtained by multiplying the number of eyes necessary in each pattern by the number of patterns plus the number of heddles required for the 20 dents, and 16 heddles for each selvage.

15. Weight and percentage of each material per 100 yd., and yards per pound of total:

Rayon: 210 ends x 105 (5% contraction) / 840x35s (The rayon is 150 denier, which is equal to 35s cotton).	.75 lb.	3½%
Color: 319 ends x 107 / 840x30	1.35 lb.	6 %
Gray: 2768 ends x 110 / 840x30	12.08 lb.	54½%
Dents: 36 in. wide x 64 picks x 107 / 840x36s	8.15 lb.	36½%
	22.33 lb. yarn in 100 yd.	

100 yd. ÷ 22.33 = 4.48 yd. per pound.

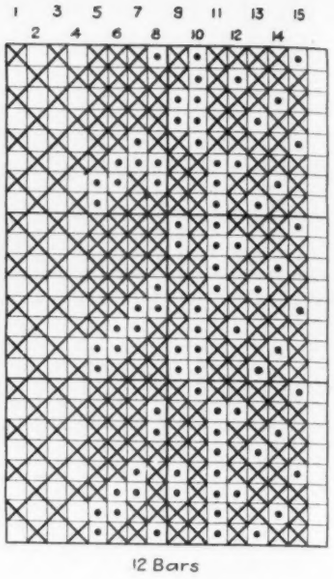


Fig. 5. Chain Draft

Carryover 82% Tenderable

Report on Quality of Cotton in Stock on Aug. 1, 1929

The quality of cotton held in the United States on Aug. 1, 1929, was lower in grade than that on hand Aug. 1, 1928, according to an estimate published by the Bureau of Agricultural Economics, United States Department of Agriculture.

Of a total of 2,312,974 bales reported by the Bureau of the Census to be in public storage, in consuming establishments and elsewhere on July 31, 1929, about 2,123,700 bales were American Upland, 7,200 bales American Egyptian, and 182,100 bales were of foreign growth.

The stocks of Aug. 1 included some of 1929 crop cotton. The amount of such cotton is unknown but 87,000 bales of the 1929 crop were ginned prior to Aug. 1, 1929, as compared with 88,761 bales of the preceding crop ginned prior to Aug. 1, 1928.

Of American cotton, 1,197,900 bales were white in color and middling or better in grade. This was 56.5% of the total upland, as compared with 69.9% last year. The proportions of other grades compared with those of last year as follows: Strict low and low middling 22.6% in 1929 against 16.9% in 1928. Below low middling 6.0% against 2.2%; spotted and yellow tinged 11.2% against 8.9%, yellow stained, blue stained and gray 0.1% against 0.3%. Owing to the revision of staple standards effective Aug. 1, 1929, no comparison of staple is made.

An analysis of figures from the standpoint of tenderability in settlement of contracts made subject to Section 5 of the United States Cotton Futures Act indicates a total of 1,748,400 bales or 82.3% tenderable against 2,193,758 bales or 90.8% tenderable in the cotton on hand Aug. 1, 1928. Of tenderable cotton 1,251,600 bales or 58.9% of total Upland range in staple from $\frac{7}{8}$ to $1\frac{1}{32}$ inches, as compared with 1,456,683 bales or 60.3% last year; and 496,800 bales were over $1\frac{1}{32}$ inches in staple as compared with 737,075 bales a year before.

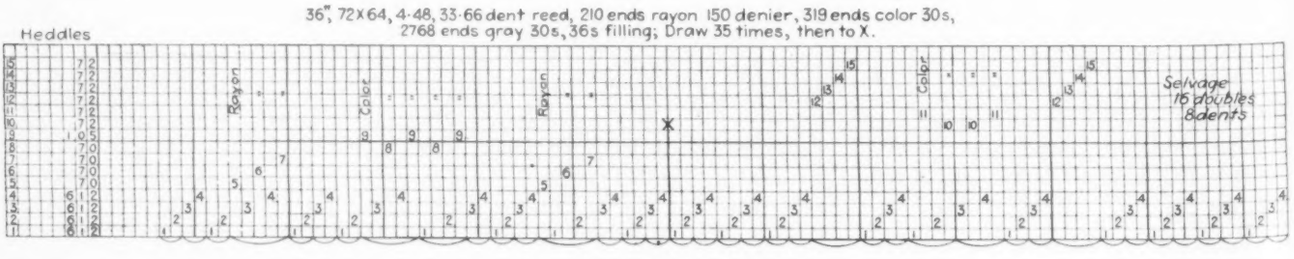
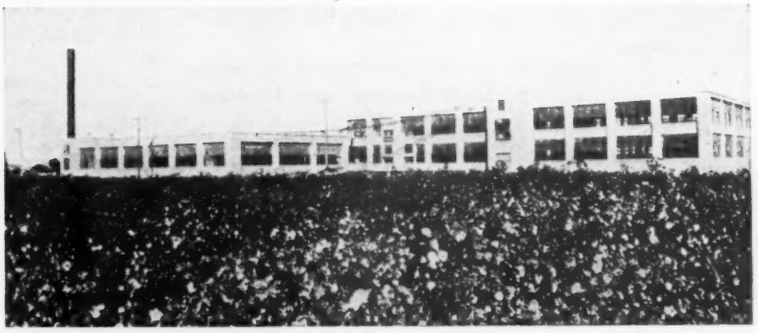


Fig. 4. Drawing-In Draft



Cotton Mill Scene in Texas

Looks for Steady, Sound Expansion of *TEXTILE INDUSTRY in* TEXAS

By Ralph C. Maultsby
Southern Editor, TEXTILE WORLD

Much has been written and said during recent years about the textile industry in Texas. Over-optimistic, as well as over-critical, statements have tended to create a confused impression in the minds of industrialists at large. On the one hand, enthusiasts have predicted that almost the entire textile industry of the country would be located in that State within a decade. On the other hand, pessimists have doubted the possibility of ever building up a really substantial industry there.

In the accompanying article, the southern editor of Textile World sets down briefly the outstanding and fundamental impressions he received from a mill trip through Texas which he has just concluded.

THE COTTON manufacturing industry of Texas during the last two years has been marked by only minor additions to plant equipment while several mills have been engaged in the replacement of obsolescent machinery. The output of textiles in the State has not been increased to any extent over the two-year period as installations of additional equipment have been offset by the closing of two yarn mills with a total of more than 25,000 spindles.

Progress Has Been Made

The textile industry of Texas obviously has made definite progress in recent years, however, as the processes of manufacture have been improved. This may be attributed to an increased technical knowledge and ability on the part of superintendents and overseers. In addition, many mills have installed modern opening and cleaning machinery which has contributed to the raising of quality standards of Texas-made fabrics.

Credit Due Association

In connection with the development of more skillful manufacturing technique, much credit is due the Texas Textile Association, an organization composed of approximately 100 superintendents and overseers, which meets semi-annually for the consideration and discussion of problems encountered in plant operation. The major objectives of the association during the last year have been:

1. Convincing its members of the value of carefully planned and carefully conducted research work in the mill.
2. Encouraging its members to read more books and magazines as a means of increasing their knowledge of the industry.
3. Securing from all mill men of Texas a more active participation in affairs and undertakings of the association.

Although there are many successful leaders in the textile industry of Texas who have behind them years of experience in that State and the cotton manufacturing centers of New England and the Southeast, the last half-decade has been marked by the elevation of a surprisingly large number of comparatively young men to positions as superintendents and managers of mills in the State. Close observers say that a new spirit of achievement is in evidence and that this is largely responsible for the advancement of manufacturing technique in recent years.

The success of cotton manufacturing in Texas, as in any other section of the country, depends to a large extent upon the kind of product made and the methods by which it is distributed. Unfavorable market conditions in cotton yarns, coupled with the fact that the Texas mills are located too far from the leading centers of carded and combed yarn consumption, brought about the closing of the two plants mentioned above, although plans are now being formulated for the resumption of operations at one of the mills.

Industry on Sound Basis

That cotton manufacturing in Texas has certain advantages and is not in an unfavorable competitive position has been demonstrated by the majority of plants in the State. Leading industrial executives and business men who are acquainted with the factors influencing the manufacture and distribution of textiles recognize the fact that the industry in Texas is resting upon a sound basis. They deplore the fact that unsound financing schemes employed by certain well known textile corporations of the State have resulted in much undesirable publicity and created a

skeptical attitude on the part of residents in Texas who may be reluctant to invest in locally promoted concerns in the future.

Diversification Developing

While the production of textiles in the State consists largely of ducks and osnaburgs, sheetings, tire fabrics, drills and other coarse goods, one modern plant is engaged in the manufacture of ginghams, shirtings, handkerchief cloth and rayon-filled dress goods. The growing importance of the Southwest as a market for woven and knitted goods has afforded an opportunity for the profitable manufacture and sale of finer materials in that section. The new full-fashioned hosiery plant of the Morten-Davis Hosiery Mills, Dallas, which was recently completed, is an outstanding example of the diversification in textile manufacturing which may be expected in Texas in the future. This plant is modern in every respect and is equipped with fine gauge machines which are operated by labor trained on the spot.

Splendid conditions are found in Texas with respect to the supply and handling of labor. An example of the intelligent management of labor generally existing was observed at one of the leading mills of central Texas where employes received their wages based on the quantity of goods produced, with an acceptable bonus arrangement. The spirit displayed by operatives in attending to their regular work in this plant clearly demonstrates the advantages in having full cooperation between employer and employe.

The Future

The future development of textile manufacturing in Texas depends, of course, to a large extent upon the prosperity of the industry in this country as a whole. Future transfers of machinery from New England and the northeastern section of the country to the South will be made with full recognition of the advantages of decentralization in the industry. Texas, Arkansas and the other southwestern States are in a position to obtain a good share of the mills involved in this migration. In 1928, Texas mills consumed but 3% of the cotton grown in that State, and with a home market consisting of more than 5,500,000 people, the future expansion of textile manufacturing there would be a logical development.

Texas July Textile Output

AUSTIN, TEX.—The review of the Eleventh District Reserve Bank, which includes all of Texas and parts of Louisiana, Oklahoma, New Mexico and Arizona, issued Sept. 1, states that the production of cotton cloth in textile mills in the district continued to show an increase over last year. The July output, although 9.7% smaller than in the previous month, was 29.5% greater than in the same period of last year. The number of pounds of cloth produced this July was 1,266,056 lb. as compared with 977,818 lb. for July of last year.

N.A.C.M. Annual Program

Sessions to Be Devoted to Manufacturing, Distribution and Fashion

Secretary Russell T. Fisher of the National Association of Cotton Manufacturers announces that tentative details of the program for the annual meeting to be held at the Copley Plaza Hotel, Boston, Mass., Wednesday and Thursday, Oct. 30 and 31, provide for separate sessions on practical manufacturing, distribution and fashion or style.

The first session will be held Wednesday afternoon, Oct. 30, and will be under the direction of several leading manufacturers who will present subjects of interest to the practical mill man; in place of the style show and dance that has been a feature of the first evening of annual meetings in previous years, it is hoped to introduce a novel feature; the session on Thursday morning, Oct. 31, will be devoted to various phases of merchandising, while the program for the afternoon session is being prepared by two fashion experts. The program for the association banquet Thursday evening will be brief, with a short talk by the president and an address by a man of national prominence.

The committee in charge of the program is as follows: George L. Gilmore, chairman, Joseph W. Bailey, George D. Flynn, Katrine Hooper, Henry G. Lord, Lenore McCormack, John F. Reardon, Ernest W. Soucy and Irving Southworth.

S. T. A. Mechanics to Meet

Division Meets at Columbia, S. C. on Oct. 3

The proper maintenance of mill villages and the upkeep of fire fighting equipment are among the interesting subjects to be discussed at the fall meeting of the Master Mechanics' division of the Southern Textile Association, which will be held at the Jefferson Hotel, Columbia, S. C., Oct. 3, according to announcements received from Joseph C. Cobb, secretary of the association.

In addition to the round table discussion which will be conducted by W. G. Young, of The Kendall Co., Paw Creek, N. C., chairman of the Master Mechanics' division, a paper on "Proper Lighting for Rayon Weaving and the Effect of Different Lighting on Rayon," will be presented by Glenn E. Parks, illuminating engineer, of General Electric Co., Charlotte, N. C.

The questions for discussion at the meeting include the following: What is a well equipped shop for an average textile mill? Does the automatic gear cutter or hobbing machine justify the investment for the average mill shop? Which is preferred, electric or acetylene welding, or should a shop have both? Should we buy special steel for making studs, etc.? If so, why? Is it bad practice to turn cold rolled steel? Does it pay to standardize on valves and other equipment in order to carry a minimum amount of spare parts? What is a well equipped carpenter shop for an average textile mill?

Plan Rayon Trade Ass'n

Executives Consider Idea of Forming New Organization

Leading executives in the rayon industry have now under advisement the possibility of organizing a trade association which would have as its chief purpose the shaping of trade policies, fixing a code of ethics and standardization plans. The project has not been developed to the point where any official announcement may be made, but it was stated authoritatively that such an organization would probably be formed some time soon.

The factors interested in the plan are in some cases the same executives who are considering a program of extended activity for the Rayon Institute, which project also is pending. It is understood that the two propositions would not conflict in any sense, because they would have different functions. The trade association, if formed, would not concern itself with promotion or any of the other activities of the Rayon Institute, it was asserted.

N. C. Welfare Commission Approves Marion and Clinchfield Plants

SPARTANBURG, S. C.—E. F. Carter, executive secretary of the North Carolina Child Welfare Commission, who recently investigated affairs in Marion, N. C., where strikes and labor troubles have been in evidence at the plant of the Marion Mfg. Co. and the Clinchfield Mills, announces that the Marion mills plant and that of the Clinchfield company are placed in the same high rating classification in construction and equipment in which are placed the Cannon, the Cone, the Erwin, the Johnston and other modern mill plants in North Carolina. He says in his report:

"In the matter of lighting and air arrangements, toilets, stairways, seats for employes, floors, walls and in all other reqirements, these two mills meet all reqirements and are in excellent condition."

Wasps Eat Boll Weevils In South Carolina

KINGSTREE, S. C.—Wasps that local farmers say are an aid in eradication of boll weevils, have been found in cotton fields here.

The grub of the wasp develops, the farmers say, inside the shape and eats the grub of the weevil. The wasp has also, it is reported, been found in other parts of the state.

Georgia Operating Executives

Hold Fall Meeting

THE fall meeting of the Textile Operating Executives of Georgia, which was held at the Georgia School of Technology, Atlanta, Ga., Sept. 17, was characterized by an eagerness on the part of the 100 mill men and representatives of concerns associated with the textile industry in attendance to acquire information from the discussion of questions on slashing and weaving that would be of real value in their respective occupations.

The morning session was given over to the consideration of problems in weaving, under the leadership of Frank K. Petrea, superintendent, Swift Mfg. Co., Columbus, Ga. Immediately following the group luncheon in the college dining room, George S. Elliott, superintendent, Pacolet Mfg. Co., Mill No. 4, New Holland, Ga., conducted the discussion of questions relating to slashing operations.

Frank Heymer, General Chairman

President J. W. Hames, superintendent, Exposition Cotton Mills, Atlanta, announced that the executive committee had elected Frank Heymer, superintendent, Eagle & Phenix Mills, Columbus, Ga., general chairman, and Frank K. Petrea, of Columbus, vice-chairman. As Mr. Petrea's term of office on the board of governors had expired, it was necessary for the association to elect a successor. Walter B. Dillard, Jr., assistant superintendent, Columbus Mfg. Co., of Columbus, was elected without opposition to serve on the board of governors for a term of two and one-half years.

The executive committee was of the opinion that the scope of the organization's activities should be extended to include the master mechanics, it was reported by Robert W. Philip, secretary of the association, and that it had been decided to devote part of the time at future fall meetings to the discussion of mechanical problems.

It was also announced at the morning session that the gold medal awarded by the Textile Operating Executives of Georgia to the outstanding student in the two-year textile course at Georgia Tech, had been received by M. A. Steele, of LaFayette, Ga., and a son of R. S. Steele, superintendent, LaFayette Cotton Mills.

Discussion of Seconds

It was generally felt that there should not be any appreciable difference in the percentage of seconds produced on wide looms in comparison with narrow looms weaving the same construction cloth, if the speed of the wide loom is proportionately slower. It was pointed out that a new loom being started on dobby goods, for instance, would probably make a larger percentage of seconds at the outset, as compared with looms that had been running on the same construction cloth for a considerable length of time.

The percentage of seconds from broad looms could only be compared with the results on narrow looms, it was said, by taking into consideration the variation in ability of weavers operating the looms. Mr. Elliott, of Pacolet Mfg. Co., suggested that cards be placed on the looms under observation and that the causes for stoppage be noted on each card, in order to determine whether the troubles were mechanical or were the result of inefficient labor.

Causes for drop threads in the cloth made on dobbies were said to be: (1) Improper setting of the harness; (2) harness strings stretching and failing to pull harness down; (3) loose pegs in the harness pattern chain; (4) fingers in dobby sticking up, due to too much oil and being out of line, thereby failing to drop at the proper time; (5) too heavy warp counts per inch for the air space in reed dents per inch. It was suggested that dobbies receive inspection for loose fingers if trouble is encountered.

No accurate method for detecting crooked or long-sided cloth on the loom could be advanced, but it was said to be readily noticed on the measuring table in the cloth room. Several causes for long-sided cloth were mentioned, the principal ones being: loose fillet on the end of sand roll; little piece of waste wound about the sand roll; crooked cloth roll; and loose ends on warp beams.

Several practical methods of distinguishing cloth woven at night from that woven in the day were suggested. Crayons were said to be satisfactory in marking the cloth for this purpose, but some mills found a rubber stamp with the loom-fixer's number or the weaver's initials could be used to indicate the time in which the cloth was woven and the machine upon which work was done. If it was found desirable to mark the cloth so that it could be identified after finishing, one member suggested tacking a small thread in the selvage; single thread for day shift, double thread for night shift.

"Aging" Filling on Quills

In cases where a mill had a sufficient quantity of quills available, it was considered a good method to allow filling yarn to "age" on the quills for as much as a week in a well humidified room. However, it was found very satisfactory to utilize conditioning rooms designed for that purpose, and provided with steam coils and automatic temperature controls. Conditioning filling with this equipment was said to prevent it from kinking in sateen, with the twist above standard, to hold the breaking strength up. If the temperature in the conditioning room should be high enough to cause the yarn sticking to the shellac surface of the bobbins, this trouble can be eliminated by giving the bobbins a bath in wood alcohol, it was stated.

Preventing Oil Spots

In order to prevent oil spots on hose and belting duck, it was suggested that looms receive a thorough cleaning each time a warp runs out. It was also found advisable to exercise care in the method of applying oil and to use only good quality oils. Bad start-ups were said to be most often due to lack of care and ability of the weaver.

The general opinion was that it is better to draw the warp in four harness, on high sley sheeting, in order to prevent crowding the yarn and to avoid chafing and shedding. The only objection to employing four harness instead of two harness was said to be that the cost of harness would be slightly greater as there would be more leather to deteriorate. Four harness with staggered cams produces a cloth with a better face, it was said.

Insulation in the roof construction was recommended for the purpose of eliminating ceiling drips caused by condensation in cold weather. One mill having a saw-tooth roof found that by slightly opening every other window in the saw-tooth to cool the air near the top of the room, about 90% of ceiling drips from condensation could be eliminated. Other mills were said to have installed steam coils at intervals about their plants to warm the ceiling and relieve trouble of condensation.

Staggered cams were said to be more satisfactory than plain cams in the weaving of broadcloth and they relieve the trouble from warp kinking. Staggered cams and multiple harness were said to prevent reed marks as well.

Tests showed that there was from 3% to more than 5% "invisible waste" between the weight of starch and compound included in the size mixture and the weight added to the yarn after it leaves the slasher, based on the net weight of raw yarn. In one case with 40s warp yarn, 2320 ends, slashing with low steam pressure and having temperature controls on the size box, the

following weights were obtained (weights represent bone dry conditions):

Net weight of raw yarn	2,221 lb.
Net weight of starch	281 lb.
Net weight of compound	15 lb.
	2,517 lb.
Weight of yarn delivered from slasher	2,443 lb.
Invisible waste of 3%	74 lb.

It was pointed out that some size mixture is usually left over each day and this is thrown away, making a difference unaccounted for in the above test.

It was claimed that much more uniform sizing and moisture content could be obtained when slashing equipment with temperature controls.

Institute Reports at Barcelona

Hines Submits Survey of Work to International Cotton Congress

ACTIVITIES of The Cotton-Textile Institute, Inc., in studying the present and potential markets for cotton textiles, with particular reference to efforts this year in behalf of styled cottons, are outlined in a report that was read Wednesday at the International Cotton Congress in Barcelona, Spain. The report was submitted by Walker D. Hines, president of the Institute at the request of Arno S. Pearse, general secretary of the International Federation of Master Cotton Spinners' & Manufacturers' Associations.

Promoting Styled Cottons

Concerning the Institute's special efforts to extend the vogue of styled cottons, Mr. Hines states:

"Steps are now under way to assure the Institute of the necessary support to enable the style promotional campaign to be continued and enlarged in its scope next year. It is hoped that other groups will be disposed to follow the example of those which are now doing this work so that eventually the industry will be engaged in a comprehensive and co-ordinated effort to increase the use of all kinds of cotton textiles.

"It is felt that the success of the Institute's special efforts to promote the demand for styled cottons this year has been conclusive enough to demonstrate to other branches of the industry the importance and value of such work. What has been done for styled cottons and for promoting longer sheets is at the outset a work which carries an important psychological effect. In every instance it is not yet possible to measure direct returns, although in connection with styled goods the industry this year will undoubtedly see a substantial increase in the volume of this particular business. We believe that the benefits accruing through this branch of the industry will be helpful to other branches which are not directly concerned with styled goods.

"It is generally recognized that much of the merchandising success of styled cottons this season has been a result of the substantial advance which the mills have made in styling and design. That the industry has made distinct progress in this direction is indicated by the fact that stylists and fashion authorities within the last year have turned to cottons with enthusiasm and genuine interest which have brought about their rediscovery in the field of fashion. It is also interesting to find opinion growing to a point which recognizes that the marked advancement in the design and finish of cottons has put them on a style parity with other fabrics. As a result we find consumer interest aroused more by emphasis upon smart styling than by an intimate knowledge of the fabrics themselves.

"The position of cottons in the field of high style has been further enhanced by designing cottons to emphasize their distinctive qualities of coolness, comfort and cleanliness. The mere fact that certain fabrics and garments are fashionable this season does not guarantee that they will be fashionable next year or three years from now unless they are made so. This new prestige has been felt in a very general stimulation of demand for other types of styled cottons in so-called volume markets. In this connection it should be pointed out that the industry is fully alert to the necessity for maintaining cotton in a prominent position in the high styled field in order to make this market a precursor and a leader of the volume market and thus maintain a high position in the entire field of styles.

"These advances in style and design and the large volume of advertising featuring cottons this year have found response in a greater consumer interest and correspondingly larger demand for many cotton fabrics printed and woven."

International Cotton Statistics

American Consumption Lower Than Expected

THE feature of the annual statistics issued by the International Cotton Federation is the reduction in the consumption of American cotton for the season ended July 31, 1929, which was 15,076,000 bales as against 15,407,000 bales for the season ended July 1928. The decrease on the season was 331,000 bales.

The following table shows the consumption of the various kinds of cottons for the twelve months ended July 31st in each year:—

	1929	1928
American	15,076,000	15,407,000
East Indian	5,178,000	4,598,000
Egyptian	989,000	973,000
Sundries	4,639,000	4,856,000
All kinds	25,882,000	25,834,000

Great Britain consumed 939,000 bales of American cotton during the half year ended July 31, 1929, as against 971,000 bales for the previous six months; Germany 474,000, against 550,000; France 405,000 against 419,000; Italy 373,000 against 372,000; Czecho-Slovakia 181,000 against 196,000; Japan 578,000 against 522,000; China 158,000 against 121,000; America 3,483,000 against 3,305,000. A feature of the consumption figures is the big decrease in the use of American cotton in Russia which declined from 317,000 bales for the six months ended January 1929 to 73,000 bales in the last six months.

The total world mill stocks of American cotton on July 31, 1929, were 2,129,000 bales as against 2,112,000 bales at the same time in 1928.

World mill stocks of East Indian cotton were 1,761,000 bales against 1,728,000 bales twelve months previously, and stocks of Egyptian cotton were 228,000 bales against 170,000 bales.

The total world mill stocks of all kinds of cotton on July 31, 1929, were 4,863,000 bales against 4,787,000 bales on the same date in 1928.

Burlap Exchange Plans Opening Oct. 16

The New York Burlap & Jute Exchange points out that manufacturers and others allied to the industries which use burlap, jute, hemp and sisal will be able to check the world market price of these commodities, by reference to the prices of this exchange when it opens for trading on Oct. 16.

The membership of the exchange includes a number of foreign shippers, as well as importers, brokers, traders throughout the United States, assuring a broad market.

The unit of trading on burlap will be 25 bales, equivalent to 50,000 yards, with 40-in. 8-oz. burlap the basis grade, suitable differentials being provided for other grades. At present prices the value of a burlap contract approximates $3,400. Fluctuations will be in .01c., a fluctuation of 1c. representing $500 per contract.

Standard grades and constructions have been fixed by the exchange, and integrity of contract assured by a Clearing House.

The New York Burlap & Jute Exchange, Inc., at 80 Wall Street, New York, will be open and ready for business on Oct. 16, and a limited number of memberships have been set aside for the legitimate consuming industries at the general price of $2,000.

Among the members of the Board of Governors are the following: W. R. Pinner, secretary and treasurer; Rutger Bleecker, Rutger Bleecker & Co., president pro tem; E. A. Canalizo, president of the New York Cocoa Exchange; F. R. Henderson, president of the Rubber Exchange of New York; Charles D. Orth, Hanson & Orth; Jerome Lewine, president of the National Raw Silk Exchange.

Foresees Passing of Design Piracy in Silks

"Representation of importers of foreign prints as well as of domestic printers in the newly organized Design Piracy Group is one of its features that promises a successful organization against the design pirate," William Menke of Menke, Kaufman & Co., Inc., stated in commenting on the new campaign that has been organized by a group of silk men against design piracy.

Mr. Menke, a member of the executive committee of this group, predicts a season next year without a single instance of flagrant copying as he anticipates the cooperation of the Federal Trade Commission with the group and the growth of the group to include other large firms in the trade who are interested in protecting original designs.

"The shirting trade has had exactly the same conditions to contend with in the past as the silk trade has experienced in the last few years and they have succeeded in obtaining the help of the Federal Trade Commission," Mr. Menke said, "So I can see no reason why this Commission will not find it possible to cooperate with the silk manufacturers and printers to the same extent."

Llano, Tex. Albert S. Johnson, is at the head of a project to establish and operate a local factory for the manufacture of mattresses. A site has been selected and operations will begin at an early date.

N.A.P.E. Hold 47th Annual Meeting

Power Show Also Held at Chattanooga Draws Crowds

THE forty-seventh annual convention of the National Association of Power Engineers, which was held in Chattanooga, Tenn., Sept. 8-13, in connection with the National Exhibitors Association, attracted more than 4,000 delegates and visitors.

The upper and lower levels of the Memorial Auditorium were filled with booths containing a wide variety of machinery and equipment used in the production, distribution and application of power. I. S. Pieters, president of the National Exhibitors Association, stated that the power show was one of the largest and most complete ever arranged by his organization.

Actual business of the convention was under way Tuesday morning, when Mayor Bass, of Chattanooga, and Albert S. Caldwell, of Nashville, Tenn., commissioner of the state department of insurance and banking, delivered addresses of welcome. Responses were made by Thomas R. Hirlihy, of Los Angeles, Cal., president of the National Association of Power Engineers, President Pieters, of the exhibitors' association, and two of the association's former presidents.

One of the principal activities of the convention was the continuance of the association's educational program, according to N. K. Chamberlin, of Detroit, who has held the position of national educational secretary for the last several years. This program includes a merit system of examination along engineering lines, which is conducted by the educational committee, and all student engineers who are members of the association are eligible to take part in this work, it was said.

Another educational activity was said to be the maintenance of an information service for members of the association, while in addition to that service, thorough instruction in cost estimation in the production of power is provided. The department makes surveys and suggestions as to the operation of large power plants.

The Tuesday afternoon session was devoted to the reports of the national officers and trustees. The report of Secretary Fred W. Raven stated that, after consistently losing members for a period of seven years, the association had turned the tables during the last year and added more than 1,000 members to its roll.

Keen interest was displayed by delegates to the convention in the matter of association politics. The election of officers was scheduled for the morning session, Friday, Sept. 13.

MODELS FROM PACIFIC MILLS STYLE SHOW

Pacific Mills "Twin Prints"—Coat of printed rayon pique and dress of printed Zamora Luster

Again Pacific's "Twin Prints"—Gem-O-Sheer chiffon and rayon pique

Tailored simplicity for Spectator Sportswear—Pacific Mills flat crepe is used in this 1930 model

Stimulation of trade and consumer interest in rayon fabrics was one of the chief aims of a style show staged recently by Pacific Mills at their New York showrooms. A wide variety of fabrics, in current dress and ensemble styles, was displayed. Three typical models are shown above.

Tariff Debate Continues

Administrative Provision Attacked from Many Points

WITH the tariff debate passing into its third week, the Senate is principally concerned with the important administrative features of the bill. Accord has been reached on many paragraphs of no appeal to the imagination of party orators but the points of most interest to industry, such as the flexible provisions, domestic valuation, and the proposed re-vamping of the Tariff Commission continue among the major issues attacked by the minority. Incidently the minority appears still to be one, though some of the Republican members, other than insurgents, threaten to bolt if better treatment is not accorded their pet products—shingles for example. The path of the Republican leaders is not smooth.

Senator Smoot is faced with the unwelcome task of requesting the Treasury Department to reveal the income tax returns of taxpayers interested in tariff making, as directed in the Simmons Resolution which was put over by the Democratic-insurgent coalition. Already the minority members of the Finance Committee have handed Chairman Smoot a list of 187 names of firms and individuals active in pressing rate changes during the hearings. A supplementary list is in preparation. Selected instances of firms which are making huge profits in spite of their tales of woe will be party ammunition later on. Senator Smoot is skeptical of the value of tax returns as an index. He will not make the names public unless directed to do so by the Committee.

Without waiting for the tax figures, many a Senator has launched forth an attack against this or that industry with whatever statistics were at hand, citing the prosperous condition of such tariff-protected groups as the steel industry and the farm implement makers. Senator Borah has once more brought up the disparity in rates between agriculture and the industrialists.

The penalty for failure to mark incoming goods as to country of origin, which provision has been subject to some legalistic rulings by the customs courts, was assailed as an invisible duty of potent effect. The marking law was itself questioned.

Much of the significance in the debate is launched in the whispering campaign between Senators Smoot and Simmons, ranking members for their respective parties on the Finance Committee, but is lost to the average auditor till published in the record on the day following. Without microphones, their words are swallowed up in the Senate Chamber, the acoustics of which are notoriously poor to begin with. Other of the party standard-bearers with big booming voices make up for this deficiency when they take their turn in the contest.

Not least among these, Senator Harrison of Mississippi, was among the first to speak directly of textile paragraphs opening the issue on wool wastes and shoddy on the side of the textile industry and on various low-valued goods in the cotton and wool schedules from the opposite view, advocating lower rates to give cheaper clothes to the poor working man.

The marking provision as amended by the Finance Committee was adopted on Tuesday by a vote of 40 to 32, a distinct coup for the proponents of the bill. This requirement is more stringent than that of the House Bill. It is specified that the marking as to country of origin must be as conspicuous and as nearly indelible and permanent as possible. The Secretary of the Treasury is given less leeway on exemptions.

On Wednesday the Finance Committee voted to disclose some 335 names of concerns and individuals whose income tax returns are asked of the Bureau of Internal Revenue. Inasmuch as the list includes most of the largest corporations in the country, the completion of the desired statistics will be a huge undertaking. As the magazine goes to press, a further move is being made to obtain more information from the Tariff Commission.

Among the textile firms whose income is to be probed by the Senate are the following:

Botany Worsted Mills, Eavenson & Levering Co., Somerville Woolen Co., Ludlow Mfg. Associates, Cheney Brothers, Sidney Blumenthal & Co., American Viscose Co., DuPont Rayon Co., Celanese Corp. of America, American Bemberg Corp., and the American Thread.

Annual Silk Dinner Jan. 16

A. B. Strange of The Read & Lovatt Mfg. Co. has been appointed chairman of the Fifty-Eighth Annual Dinner Committee of the Silk Association of America, Inc. The dinner will be given at the Astor Hotel, Jan. 16, 1930. Other members of the committee in charge of arrangements for the dinner are W. Robert Blum, United Piece Dye Works; Paul Hyde Bonner, Stehli Silks Corp.; Frederick H. Knight, Susquehanna Silk Mills; J. M. Potts, E. Gerli & Co., Inc.

U. S. Delegates to Silk Conference Named

Austin Cheney Will Head American Delegation—Japanese Delegates

American delegates to the Second International Technical Raw Silk Conference which is to be held in New York, Oct. 15 to Nov. 8, were announced Sept. 16 by the Silk Association of America, Inc., under whose auspices the conference is to be held.

Austin Cheney, Cheney Brothers, will head the American delegation with D. E. Doty, United States Testing Co., Inc., as vice-chairman. J. A. Nary, United States Testing Co., Inc., will be the secretary of the delegation. Other members include H. B. Arundale, United States Testing Co., Inc.; Albert Bosshard, Stehli Silks Corp.; G. H. Conze, Susquehanna Silk Mills; A. Coradi, Schwarzenbach, Huber & Co.; Charles G. Duffy, The Duffy Silk Co.; Jacques Hoffman, Duplan Silk Corp.; Charles C. Hertel, C. K. Eagle & Co., Inc.; Charles J. Huber, Cheney Brothers; F. D. Huntington, Real Silk Hosiery Mills, Inc.; Charles Muller, Sulzer, Rudolph & Co., Inc.; Frederick K. Schmutz, National Raw Silk Exchange, Inc.; S. Bruce Smart, Morimura, Arai & Co., Inc., and William S. Wheeler, Jr., McCallum Hosiery Co.

Frank Farrell of London, president of the Silk Association of Great Britain and Ireland, will represent those two countries at the conference. Robert H. Stehli, Stehli & Co., of Zurich, Switzerland, will be the Swiss delegate.

Soy P. Woo of the Soy Lun Filature, Shanghai, will be the chairman of the Chinese delegation, and An Lee, Shanghai, will be its secretary.

Japanese delegates include Dr. Tatsushiro Kagayama, vice-president of the Raw Silk Association of Japan; Toshihiko Miyazaki, Yokohama Conditioning House; Mantaro Matsumoto, Yokohama Conditioning House; Yutaka Mikouchi, Mitsui & Co., Ltd.; Masami Toyobe, Japan Cotton Trading Co., Ltd.; Rinpei Imai, Morimura, Arai & Co., Inc.; Fumio Aruga, Katakura Filature; Kanjiro Hirakawa, Yamajiu Filature; Sakujiro Shingu, Gunze Filature; Namiji Oki, Kobe Conditioning House; Einosuke Ishii, Bureau of Sericulture; Takeo Ito of New York, Mitsui & Co., Ltd.; Jiro Mayuzumi of New York, Hara & Co., and Nobusuke Egawa of New York, Morimura, Arai & Co., Inc.

N. E. Woolen Dealers Golf

Woolen dealers from all parts of the New England States, mostly Boston, Mass., met at the Norwich Golf Club at Norwich, Conn., on Friday, Sept. 13, for their annual social gathering and golf tournament. Golf play was the principal even of the day, a 36 hole tournament running through the morning and afternoon, dinner being served at noon. About 100 dealers attended.

S.T.A. Weavers Discuss

Elimination of Imperfections in Rayon Fabrics

E. A. Franks, Chairman, Weavers Division, S.T.A.

METHODS of eliminating imperfections in rayon fabrics featured an interesting discussion at the fall meeting of the weavers' division of the Southern Textile Association, held in the Poinsett Hotel, Greenville, S. C., Sept. 13, and attended by approximately 200 members and visitors. Problems in connection with slashing and weaving of cottons were also considered at the gathering, which was presided over by E. A. Franks, superintendent, Dunean Mills, of Greenville, chairman of the weavers' division.

Glenn E. Parks, illuminating engineer, General Electric Co., Charlotte, N. C., presented a paper at the afternoon session on the subject, "Proper Lighting for Rayon Weaving," which pointed out the essential factors for satisfactory illumination in the weave room and attributed many of the ills in the weaving of rayons to improper lighting.

Mayor-Elect A. C. Mann, of Greenville, delivered an address of welcome, following the invocation by the Reverend W. H. Brown, of Dunean Mills. Stressing the significance of group meetings of superintendents and overseers from textile plants, in responding to the address of welcome, Leonard Howard declared that all men in the industry should think intelligently on its problems before they proceed to "bite the hand that feeds them."

Warp Slasher Speed

In the discussion of the first question presented by Chairman Franks, there was some difference of opinion as to the best speed for the slasher on print cloth numbers for warps up to 4,000 ends. Satisfactory speeds ranging from 27 to 47 yards per minute were reported. In one instance it was stated that the slasher, with automatic temperature controls on the cylinder, had been stepped up from 36 to 40 yards per minute with excellent results.

Several causes for "tear drops" in all-rayon fabrics were advanced. Excessive stretch of yarn in slashing, causing the rayon to appear "dead," and too much size resulting in a stiffening of the yarn, were said to make the warp yarns "pucker" in weaving and create the "tear drops," or "rain drops," as they are sometimes called. Uneven tension on individual ends of the warp was also said to be one cause for this trouble in weaving solid rayon fabrics.

The higher quality rayons were said to require less sizing than inferior yarns, but the proper amount of size should be determined with regard to the type of goods to be made, atmospheric conditions in the weave room, and whether or not cotton and rayon are being woven in the same room.

The tendency is apparently toward lighter sizing in order to produce fabrics with a soft feel, it was stated. Finishers were said to have trouble sometimes when the size is "baked" into multifilament yarns, whereas it should be lubricated enough for the filaments to stick together.

According to C. P. Dill, overseer weaving, Brandon Corp., Greenville, S. C., a speed of 160 picks per minute on 40-inch automatic looms was found to be more satisfactory for print cloth numbers, with lower cost of repairs and less warp breakage than at higher speeds. In another mill it was stated that an increase in speed of looms from 150 to 160 picks per minute, on 60s warp, 72x100 construction cloth, resulted in approximately 10% greater production.

Oiling of Rayon

The oiling of rayon in skeins before winding for filling was not thought to be as necessary as it was when yarn quality was lower than at present. The most common methods of applying oil to rayon skeins were said to be spraying with atomizers and soaking in vats containing oil. One member stated that his plant soaked the skeins in vats for 15 minutes, with each ten pounds of rayon wrapped in cheese cloth before being placed in the oil, and then extracted for about 30 minutes.

Another mill found that by opening the books of skeins on a table, spraying with high pressure and allowing them to stand over night before winding, the percentage of oil required could be reduced from 6% to about 1½%.

Check straps made of cotton had been used in several mills, but in most cases they had to be removed after a time because they failed to check properly. It was stated that the average life of a good leather check strap is two years or longer.

On carded broadcloth, 100x60, it was found that the average number of loom stops per day was from ten to eleven. The experience of several members present was in substantial agreement on this question.

Best results were said to be obtained in weaving sateens, 104x64, with high whip roll and sand roll, running four down and one up. The "feel" of the cloth was said to depend to a large extent upon the point at which the shed begins to close on the filling and upon how much the filling is pulled through the shed.

Importance of Illumination

Many of the difficulties encountered in weaving fine fabrics result from improper vision, according to Mr. Parks, who presented his paper on lighting immediately after the lunch period. The essential factors for good lighting were said to be: Sufficient intensity, level and softness. The amount of artificial illumination required in weaving plants depends upon local conditions, it was stated, but approximately two watts for every square foot of floor space was

(Continued on page 67)

With · the · Editors · This · Week

Stigma Must Be Removed

ONE more outrage has been added to the succession of deplorable incidents which have been an aftermath of the textile labor disturbances in the Gastonia section of North Carolina. The fatal shooting of a woman last Saturday by someone in a group of so-called "anti-Reds" was of course far more tragic and regrettable than the alleged kidnapping and beating of three union men immediately after the abrupt termination of the trial of a group of communists on the charge of killing the chief of police of Gastonia.

Pending conclusion of legal investigation, it is still too early to charge this latest crime against any group of men or any particular class interest.

Textile manufacturers of that section owe it to themselves as well as to their State and the country at large, to lend every possible aid to the authorities in fixing responsibility for these outrages. The crimes are being interpreted throughout the country as another indication of the "deplorable conditions in southern textile mills". As a matter of fact they have no bearing whatsoever upon this subject. They represent the half-mad actions of a group of men who have allowed themselves to become infuriated by the preaching of communistic doctrines in their towns. The unfair stigma which such actions have cast upon southern textile manufacturers can be removed only by immediate identification and punishment of all who instigated or participated in this mob violence.

Textile Forums

IN INAUGURATING this week group meetings of cotton mill agents, superintendents and overseers for the discussion of their manufacturing problems the National Association of Cotton Manufacturers is performing a service that may be made very valuable to the participants and the mills they represent. The frank interchange of expert manufacturing knowledge thus made possible should go a long way toward developing standards of best practice in every department of the cotton mill.

That has been the tendency in the South where the Southern Textile Association has been conducting these group meetings for several years. They have proved of particular value there in providing first-hand information of a practical nature regarding new machinery, devices and processes based upon actual mill experience.

Yet it should be remembered that these group meetings can do little more than supplement by personal experience, and infrequently, the news and experience of industrial developments that are to be found in every well edited trade paper, or that may be obtained from such a paper for the asking. These group meetings, however, provide personal contacts that may prove of great value to participants and have the possibility of unlocking valuable sources of information based upon practical personal experience. To render them of maximum value all who attend should be as free to give of their knowledge as to take. As President Lincoln Baylies of the National Association stated at the opening meeting last Thursday "the days of manufacturing secrets in the cotton industry are past" and the man who gives up what he considers to be a secret is likely to get two so-called secrets in return.

Falling Over Backwards

COTTON yarn merchants are selling at figures that are little if any different from those quoted by spinners. This is especially noticeable because prices named by the latter have averaged as high as a cent above actual selling prices for many months, dealers cutting their commissions to attract business. It also indicates that conditions in the sales yarn field have recently been swinging more toward the sellers' favor. The buyer no longer has everything his own way.

Although demand for yarns fell off during the summer, a seasonal and usually to-be-expected development, it has been apparent that it was sufficient to prevent accumulation of stocks in spinners' and dealers' hands. Commission houses usually holding the largest stocks reported late last month their supplies were smaller than normal.

Dealers themselves had finally been won over to the buying policies followed by manufacturers, having come to the conclusion this summer for the first time that so long as manufacturers would not pay them a premium for spot supplies they would not keep such a representative stock on hand. They found carrying stocks was frequently unprofitable and as a result have been reducing them gradually.

Notwithstanding this seasonal decline in buying during the summer, many spinners booked sufficient business for early delivery to take bulk of their September and October production, several recently having refused business calling for shipment earlier than Nov. 1, since smaller demand had been offset by curtailment by spinners.

Buying has been of an even more severe hand-to-mouth

fashion because of the general opinion among manufacturers that cotton was going to sell lower. They based their hopes on a large crop. Many buyers refused to cover their actual needs while waiting for this development which to date has not been seen.

These forces have brought about a situation in the sales yarn field where manufacturers in instances have found themselves unable to obtain deliveries of the yarn wanted at the time it was needed to keep their machinery in operation. They found so many other buyers had the same buying idea that spinners and dealers were unable to make delivery out of stock or from production within the time specified.

While there is no doubt that sales spinners can produce more yarn than manufacturers will consume over a period of time, this does not help a buyer needing his regular yarn to run his looms or knitting machines next week. Hand-to-mouth buying can be overdone. Failure to cover actual needs until too late may be unprofitable as overbuying proved several years ago.

A Century Behind the Times

THE Ghandi movement in India being a protest against mechanization of industry, and designed in part to provide maximum work for a maximum number of peoples in their homes, it seems strange that this society should be offering a prize of approximately $37,500 for a hand machine that will gin, card and spin cotton from the coarsest numbers to as fine as 20s with a maximum production of 16,000 yards in an eight-hour day.

Perhaps nothing more aptly illustrates the economic error and futility of the Ghandi movement, and of all effort to check industrial progress, than the fact that a machine meeting practically all of the requirements of the contest, with the possible exception of producing the finest counts in quantity, was in use in this country more than a century ago. One of the original machines was on exhibition at the last textile machinery show in Greenville, S. C., and we believe that both the Smithsonian Institution at Washington, and Henry Ford at Dearborn, Mich., have types of these ancient machines that would qualify for Ghandi's prize.

Maximum opportunity for mental, moral, social and religious progress is not to be attained for a maximum number of peoples by Ghandi's methods, but by their antithesis—by constant effort toward automatic machine production, employing a minimum number of operatives a minimum number of hours at maximum pay, thus liberating larger numbers of workers for other industrial effort, encouraging development of new industries and giving both workers and their dependent women, children and old folks greater opportunities for all other activities that make life worth living.

The offering of this prize is open admission of the basic economic error of the Ghandi movement, and of all effort to check maximum automatic mechanization of industry. For the industrial and social future of India it is a hopeful sign.

The Wool Price Trend

PRICES of wool at the recent Adelaide and Sydney sales and at the opening of the September series of auctions in London this week merely confirmed prices that were current in the open market. Those prices are approximately 30 per cent lower on merino wools than they were a year ago, and tops, yarns and cloths had been re-adjusted to that price basis. The decline in crossbreds has been much less with price strength greatest on the coarsest qualities.

So much for wool market history; now as to the trends: The unsold stock of merino wools, plus stocks in manufacturers' hands, plus an increased Australasian clip make a formidable world supply that may prove burdensome if European trade fails to improve, as now seems probable, and if style trends favor crossbred wools, as also seems well defined. The latter, despite possibly lessened demand from Germany and some other European countries, seems likely to hold crossbred prices fairly firm, particularly on the coarser qualities.

Until recently anyone who predicted a world supply of merino wools relatively greater in proportion to demand than of crossbreds would have been laughed to scorn; yet that is the situation today notwithstanding the fact that the annual world production of all wools is about 150,000,000 pounds less than the pre-war average.

The Textile Trend

Cotton Textile Markets: Cotton goods situation clearer, and buying improves; prices held firm, especially at the household goods end. Yarns were spotty, and some hosiery cone firms were underselling; insulating trades were buying in good quanity. Raw cotton future not cleared up by last report.

Wool Textile Markets: Buyers are still more interested in sampling than in ordering. Limited amount of business placed; flannels were active, and "come-back" is looked for, especially in skirtings and dress goods. Good demand for knitting worsted yarns; weaving interest spotty.

Knit Goods Markets: Hosiery demand improved, especially in full-fashioned; prices tending toward stabilization. Men's fancies still backward, but staples are receiving marked attention of buyers. Children's hosiery active.

Silk Textile Markets: Raw silk drops 5 to 10c. and further decline is expected; importers hope drop will aid buying. Thrown silk somewhat firmer, with upward trend in prices; demand spotty. Spun silk hesitant. Broadsilks demand slackens, but metals are strong. Satins and other staples in fair call. Velvets quiet.

Federal Exhibit to Dramatize Story of Cotton

The story of cotton and its many uses, new and otherwise, will be the feature of an exhibit now being prepared by the U. S. Department of Agriculture for the National Cotton Show held in connection with the Mid-South Fair and Dairy Show at Memphis, Tenn., Sept. 28-Oct. 5.

Among the many newer uses of cotton which the exhibit will suggest is the use as bagging for bales of cotton. Four bales that travelled to Germany and back in "cotton overcoats" will be on display for comparison of cotton bagging with the jute bagging commonly used.

New Contract Rates On Raw Silk Freights Adopted

SEATTLE, WASH.—The trans-Pacific freight bureau at Hong Kong, China, and the North Atlantic freight bureau of the same port have jointly adopted the contract rate system on raw silk and silk waste, placing the contract rates at new low figures, effective Sept. 1, 1929 to March 30, 1930, according to word received here. The rate on silk to New York, recently cut from 50/- to 40/-, is now cut to 37/- on contract, or 46/- non-contract. The trans-Pacific rate, recently cut from $8 to $5, will likely be $4.50 contract, or $5.50 non-contract, it is stated.

The present tariff rates on silk waste, $13 per 440 cubic feet to New York and $10 to the North Pacific, will be contract rates, with non-contract quotations 25% higher.

Reductions in Shanghai, China, rates and probably Japanese also are expected to follow.

N.Y.U. Gives Course on Knit Goods

A comprehensive course covering the manufacture of hosiery and knit underwear, particularly adapted to those interested in the merchandising of these products, will be conducted by the School of Retailing, New York University, beginning Thursday evening, Sept. 26, from 6 to 7:45 p.m., and continuing each Thursday evening thereafter for the balance of the term.

The outline of the course includes explanation and discussion of fabrics and fibers, hosiery and underwear machinery, kinds of hosiery and knit underwear, woven fabric and glove silk underwear, etc. It is also planned to show moving picture films covering the manufacture of full-fashioned hosiery, rayon, cotton, wool, silk, etc.

The instructor of this course is George A. Urlaub, of the Tubize Artificial Silk Co. of America, and formerly manager of the service department of *The Underwear & Hosiery Review*, under whose guidance it was inaugurated in 1922.

Registrations are now being received at the office of the School of Retailing, Room 811, 32 Waverly Place.

N. England Overseers Meet

First Meeting of N.A.C.Ms. Textile Forum in Boston

BOSTON, Sept. 19.—"Cotton mill executives and the men in the mill will find opportunities for greater efficiency in manufacturing and a better understanding among the personnel in the series of meetings which we are inaugurating here today," declared President Lincoln Baylies of the National Association of Cotton Manufacturers, in opening the Textile Forum of that organization.

"We can well assume," he continued, "that the days of manufacturing secrets in the cotton industry are past and it is through the realization of this fact, as well as through discussions of problems by the men in the mills, that the interests of all concerned will best be served."

About 100 agents, superintendents and managers of cotton mills from practically all the textile communities of New England and New York state attended the meeting, which opened in the Boston City Club this morning at 10:30 o'clock. Group meetings of overseers of various departments in the mills will be held from time to time throughout this year and next Spring, beginning with the overseers of carding Oct. 10. These sessions will constitute the Textile Forum of the Association.

President Lincoln Baylies, following his brief talk to welcome the gathering, turned the meeting over to the chairman, John F. Reardon of North Grosvenor-Dale, Conn. The discussion included the general subject of employe relations, methods and terms of employment, employe contact, benefits, accident prevention, etc. Other topics were: "Determination of the number of spindles that can best be operated on frame spinning," and "What are good systems and methods to adopt to secure the most economic production in the weaving department?"

TEXTILE CALENDAR

Cotton Yarn Merchants Association, Annual Meeting and Outing, Penn Athletic Club, Philadelphia, Pa., Sept. 24.

Worsted and Woolen Yarn Spinners' Outing, Manufacturers Country Club, Oreland, Pa., Sept. 25, 1929.

Southern Textile Association, Master Mechanics Division, Fall Meeting, Jefferson Hotel, Columbia, S. C., Oct. 3, 1929.

International Raw Silk Technical Conference, Silk Association offices, New York, Oct. 15 to Nov. 8, 1929.

Committee D-13, American Society for Testing Materials, Fall Meeting, Providence, R. I., Oct. 17-18, 1929.

National Association of Cotton Manufacturers, Annual Convention, Copley Plaza Hotel, Boston, Oct. 30-31, 1929.

National Power Show, Grand Central Palace, New York, Dec. 2-7, 1929.

Silk Association of America, 58th Annual Dinner, Hotel Astor, New York City, Jan. 16, 1930.

International Exposition, Textile Exhibitors Association, Mechanics Building, Boston, Mass., last week in April, 1930.

Ninth Southern Textile Exposition, Textile Hall, Greenville, S. C., Oct. 20-25, 1930.

Ancient French Textiles and Designs Exhibited

A textile exhibition, including eighteeth century French brocades, embroideries and original designs, will be held at the Boston (Mass.) Museum of Fine Arts from Sept. 19 until Nov. 15. It represents the invention and thought of one of the great manufacturing ages in the past, which built up the silk industry of Lyon so securely that it continues the great factor of the present day.

The collection suggests possibilities in the modern design that are unlimited. Although made primarily for silk, the whole trend of cotton has been so much along the same lines that development of some of the ideas would be most interesting.

The exhibition shows fine examples of weaves and embroidery from the period of Louis XIV, as well as the "mise-en-cartes" and stencil rubbings. Some are the work of the best known artist textile designers of the time, including Philippe de la Salle, the originator of designs that are carried to this day by the house of Tassinari and Chatel of Lyon, and Francois Boni, who was another recognized artist in the field.

The "mise-en-carte" in the exhibit might have been done yesterday for any jacquard loom. At first glance, they suggest a cross-barred dimity weave with an overprint.

The management of the Museum has worked to make the exhibit of practical value. Manufacturers who visit the exhibition will find it particularly well arranged for study.

Rayon Stocks in Bond

The Department of Commerce reports as follows on stocks of rayon held in bonded warehouses on July 31, 1929:

Description	Pounds	Value
Rayon waste, staple fiber, waste not advanced further than sliver or roving, and yarns made from waste.....	382,835	$170,158
Yarns, threads and filaments..	2,801,825	1,795,438
Comparative Figures for June 30, 1929		
Rayon waste, staple fiber, waste not advanced further than sliver or roving, and yarns made from waste.....	346,530	170,249
Yarns, threads and filaments..	2,902,243	1,825,165

Asheville (N. C.) Knitting Mills, Inc., of which W. Y. Frazier is president, were reopened this week after being closed for several months.

Don't Be Afraid of THE MICROSCOPE!

Article V*

Useful Accessory Equipment

Fig. 1. Euscope Arranged for Observation

By Edward R. Schwarz, S.B.,A.T.I.

FOR THE convenient operation of the microscope and for its efficient use in many of the purposes for which it may be employed, the aid of certain accessory equipment will be found advisable and frequently necessary. Until certain types of supplementary devices have been put into actual service, no accurate conclusion can be drawn as to the real possibilities of the instrument. It should be realized that not only increased ease of manipulation and observation may be made possible, but that in many cases much time may be saved and accuracy of determination may be improved.

Projection Possibilities

Direct observation is usually considered the main use of the microscope and its possibilities as a projection instrument are often overlooked. Instead of forming an image by the agency of the eye alone, we may, with or without the aid of a mirror or a prison, project the image on to a screen where it may be studied by a single observer at his ease, or simultaneously by a group of persons.

For this purpose, there is on the market an ingenious device known as a "Euscope" (Fig. 1). This is essentially a projection box arranged horizontally above any microscope and provided at one end with a viewing lens which relieves eyestrain and allows for the accommodation of the eyes, when both are employed at the same time for looking at the specimen. At the other end, which is conveniently enlarged, there is a metal screen surfaced with magnesium tungstate which gives a very fine grain and is therefore suited for the reproduction of detail in the magnified image. Part way between the ends of the viewing chamber is located a silvered right-angled prism which bends the rays of light proceeding from the microscope and directs them toward the screen.

With the object properly mounted and a powerful illuminant, such as the arc, tungsarc, 400-watt Mazda, or a 50-candle-power low-voltage substage illuminator (See Article IV), a clear image is produced on the screen when the microscope is focused. All manipulation of the instrument is as usual, and the observer may sit at his ease before the viewing chamber, which should come at the normal height of his eyes. If the observer wears glasses, they should not be removed.

Other Uses for Equipment

If the metal screen is replaced by a piece of ground glass (provided by the manufacturer in a readily adjustable mount) the image becomes visible to a group of people simultaneously. For rough work, a camera attachment may also be obtained, and quite satisfactory pictures will result if care is taken to determine the correct length of exposure, and to prevent the jarring of the apparatus. On the whole, a regular photomicrographic outfit is to be preferred where much of this sort of work is to be done.

It is also possible to make most of the routine measurements — such as diameter, length, etc.—by means of an eyepiece micrometer disk inserted in the ocular. The latter should be of the focusing type in order that the image of the scale may be sharply outlined on the screen. Opaque objects cannot be very satisfactorily examined by the above means because of the insufficient intensity of the illumination.

Where direct projection on to a large screen is desired, splendid results can be obtained with almost any of the out-

*Article I, "Possibilities of Microscope in Textile Industry," appeared April 27, p. 31. Article II, "Types of Microscope Applicable to Textile Industry," appeared May 18, p. 55. Article III, "Handling the Microscope with Efficiency and Understanding," appeared June 22, p. 40, and June 29, p. 57. Article IV, "Methods of Illumination," appeared August 17, p. 52. Future articles are to discuss micrometry, mounting specimens for examination, rapid sectioning, precision sectioning, staining, photomicrography of textiles, polarized light, analysis of fabrics and yarns, etc.

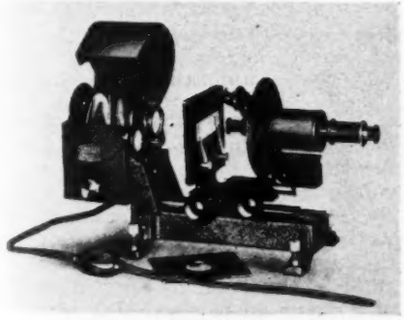


Fig. 2. Projection Microscope, Horizontal

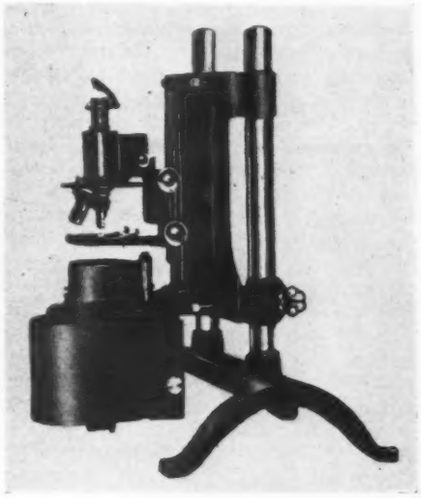


Fig. 3. Projection Microscope, Vertical

fits manufactured for this purpose. The system illustrated in Fig. 2 has been found to be thoroughly satisfactory and extremely rapid to handle where a wide range of magnifications and resolution are demanded in quick succession. It is suited for use with transmitted light only, but with this limitation will be found to be a very practical and usable device. It may be mounted horizontally (Fig. 2) or vertically (Fig. 3), as the case demands. For specimens placed loosely on the stage or in liquid mounts, the latter position is preferable.

In addition to the simple projection of the specimen for examination, it can be used to advantage to check the shape of holes in rayon spinnerets, areas of filament cross-sections, etc. When used to project the image on to a sheet of paper there is no difficulty in drawing in the details for permanent record. It is self-evident that the results with a camera attachment, the sensitized plate

Fig. 4. Stand and Microscope Arranged for Projection on to Drawing Board

serving instead of a screen, will be equally good.

Special Stands

For laboratory use where rigidity and accuracy of operation are important a special stand to take the microscope, camera, and drawing board, together with the illuminant, can be obtained (Fig. 4). The use of the camera will be discussed in some detail in a future article, but the apparatus serves equally for projection direct, as well as for sketching. The illustration shows the apparatus set up for drawing the image as projected on to the drawing board. Magnification may be altered by a vertical adjustment of the board. By simply swinging aside the mirror or prism, and slightly altering the focus, the apparatus serves as a micro-projector. It is not so flexible as the regular projection units, but this can well be made a secondary consideration since its prime function is that of photomicrography.

For general utility in the laboratory two stands are provided by one manufacturer for use in projection with the microscope—both for demonstration and drawing (Fig. 5). These are supported on heavily nickled tubes, and are adjustable vertically to any desired height. One takes the illuminant (the 400-watt type is advised), while the other provides a clamp and support for the microscope which should be tilted to a horizontal position at the inclination joint. Attached to this stand is a metal hood with a viewing opening, and

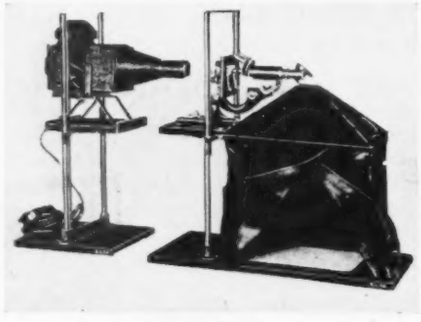


Fig. 5. Convenient Arrangement for Making Micrographs

with black curtains so suspended as to cut off extraneous light from the drawing board, which forms the base of the stand. The units are adjustable independently, and it will be found that the support for the illuminant is a decided convenience for general work of all sorts where this source of light is desired. The expense is low in comparison with the other means employed.

For Demonstration

A still further piece of accessory equipment for the purpose largely of demonstration is found in a compact unit, the cost of which is less than that of a microscope alone, and which is self-contained (Fig. 6). Nothing else is needed for its use. The entire instrument measures 9½ in. high and 10 in. long and may be arranged for either

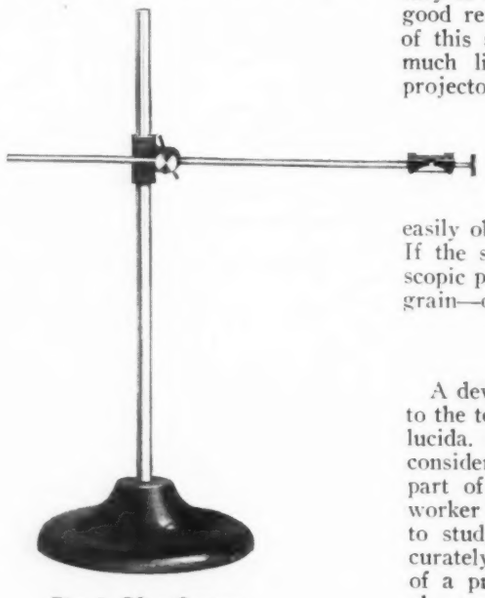


Fig. 7. Blye Camera Lucida

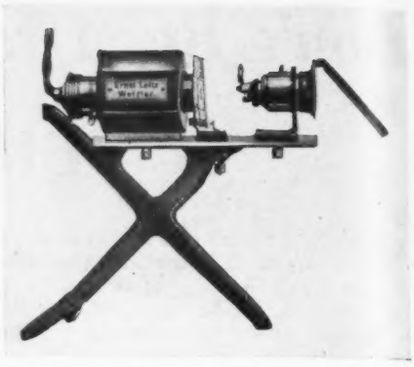


Fig. 6. Simple and Compact Micro-Projector

horizontal or vertical projection. It is equipped with a 6-volt lamp in a light, tight housing with screws for perfect centering, a square object stage with condenser attached, and a pair of stage clips. The objectives are the divisible type of 24- and 40-mm. focal lengths, and the front element is made to swing out for quick action in changing from one to the other.

The outfit also includes a mirror for projection and drawing, and the necessary rheostat with plug cord and connections. A special 64-mm. objective may also be obtained to make the instrument suitable for the projection of film strip slides, for which a special stage attachment is provided. The whole apparatus will pack into a convenient carrying case. With a screen 15 ft. away, magnifications up to 230 diameters are possible.

Any plane surface of light color may be used as a screen for projection purposes. In this case it is necessary to darken the room. To avoid this, a daylight screen of some standard make may be employed. The projector is mounted *behind* the screen, which is made of specially coated and processed fabric—usually silk. The spectators view the pictures from the front. It is not necessary to darken the room at all and very good results are obtained with screens of this sort for micro-protection. Too much light from sources outside the projector and from the rear of the screen is to be avoided wherever possible. Ordinary light as from a window will not be found to be objectionable. Images 2 to 3 ft. square are easily obtained and are sharp and clear. If the screen is to be used for microscopic projection it should be of the fine grain—or micro—type.

Camera Lucida

A device of more than ordinary value to the textile microscopist is the camera lucida. Of so great importance is this considered that it should surely form a part of the regular equipment of any worker with the microscope who wishes to study textiles conveniently and accurately. In its simple form it consists of a prism so mounted that when the observer looks through it, he sees not only the object which he is studying, but

also the paper upon which the drawing of the object is to be made (Fig. 7). As adapted to the microscope it appears of somewhat more complex form (Fig. 8).

The prism is mounted above the eyepiece, which contains the usual ocular, and is equipped with an adjustable bar carrying a mirror so that rays of light proceeding from the specimen on the microscope stage are combined with light coming from a piece of paper lying beside the instrument. The observer sees the specimen as if it were lying on the paper, and it is not at all difficult to draw in the object. The pen or pencil point is clearly seen and the delineation of the subject completed easily. There is also the further advantage that a drawing or a photograph of a fiber, yarn, or fabric may be placed on the table and compared directly with the specimen without having to turn from one to the other, or needing to look away from the microscope. The picture and the original appear side by side in the same field.

By placing a stage micrometer in position on the stage of the microscope the image may be accurately drawn in on a piece of paper, celluloid, or cardboard. Then, on replacing the stage micrometer by a succession of speci-

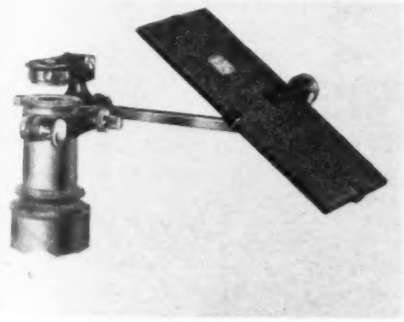


Fig. 8. Camera Lucida Arranged on the Microscope

mens, they can all be measured quickly and conveniently by manipulating the scale just as an ordinary rule would be handled. Except for focusing, the adjustment of the instrument must not be interfered with in such a way as to destroy the precision of the scale graduations as drawn. It is a simple matter to draw up a series of scales, ruled squares, protractors, etc., for any combination of objective and ocular. In each case the draw-tube length, mirror-bar length, and mirror angle should be noted so that they may again be set correctly at any future time.

For Counting Objects

For counting objects the camera lucida attachment is invaluable. Take for example the case of a rayon yarn of a large number of filaments, say a 150 denier Bemberg of 112. By the use of a ruled square in the eyepiece, these may be accurately counted, but the size of the square must be correct or it cannot be used efficiently. Then, too, a more or less complicated system of counting must be used. In the case of the camera lucida, only a piece of

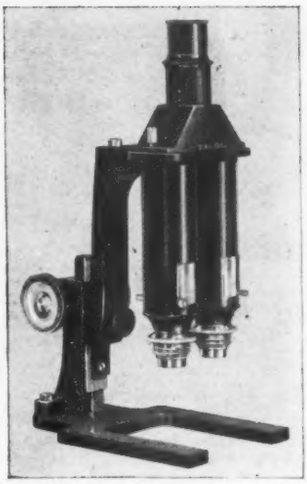
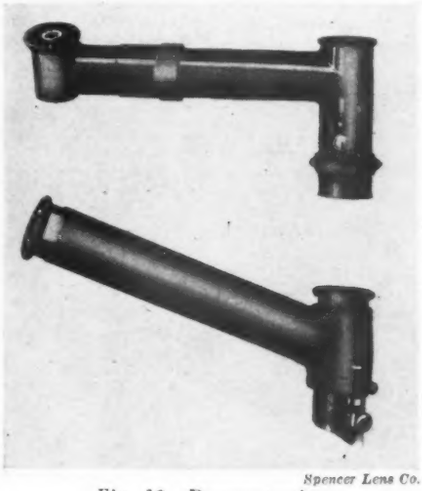


Fig. 9. Low-Power Comparison Microscope

plain white paper is required. The filament sections stand out clearly on this and can be checked off with a soft pencil as they are counted. Thus no filament is likely to be omitted or counted twice. When the count is ended, a rapid survey of the field shows immediately whether each section bears a mark and gives a convenient check on the work. Simply pointing out each section as it is tallied makes the task immensely easier. In comparison with projection, the camera lucida has an advantage. An intense illuminant is unnecessary. Ordinary light from a window is often quite sufficient. Opaque objects or specimens lighted from above or by differential or dark-ground illumination (Artcle IV) can be distinctly seen.

The only difficulty is the need for having the paper and the specimen under equally brilliant illumination. If the specimen is more brightly lighted than the paper it will be hard or even impossible to distinguish the pencil or the outline on the paper clearly. On the other hand, if the paper gets an undue share of the light, the pencil and drawing are shown distinctly but the specimen becomes faint and hazy and loses detail.

In order to equalize the illumination, one form of camera lucida is provided

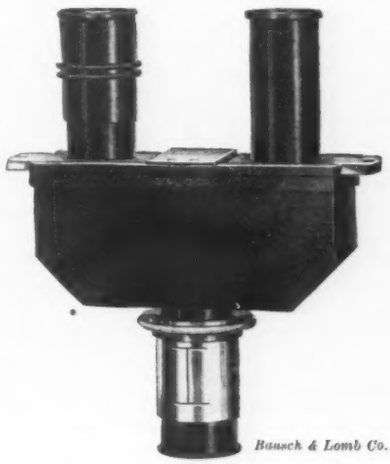


Spencer Lens Co.

Fig. 10. Demonstration Eyepiece

with means for bringing a series of smoked glasses of varying degrees of opacity into either or both beams of light, and consequently provides ready adjustment of the illumination. These glasses are usually mounted in rotating collars integral with the prism body and are quickly turned into position as may be required. Very little practice is required to show the proper arrangement for any given case. Means are also provided for centering the prism; and, while the instrument with these various features of adjustment costs somewhat more than one not similarly provided, the author believes that the additional cost is more than justified by the increased efficiency and convenience.

It may sometimes be necessary to provide extra illuminaton for the paper. This may be the case when it is important that critical illumination be employed with a high-power objective in order to get complete rendition of detail. Here a bullseye condenser arranged to deliver parallel rays from the same illuminant that lights the sub-



Bausch & Lomb Co.

Fig. 11. Binocular Eyepiece

stage mirror may be used; or something else, such as a ceiling light, may be used for its source. A small concave mirror mounted in a universal clamp will also serve the same purpose (Article IV). Often a judicious turning of the illuminant which supplies the microscope with light will illuminate the paper sufficiently while still furnishing light enough to the substage condenser for satisfactory lighting of the object.

Comparison Eyepiece

When it is desired to compare two samples and two microscopes of the same sort are available, each instrument may be focussed upon a specimen and the draw tubes connected by a comparison eyepiece. The horizontal tube of the latter contains a system of prisms which bring the light from the specimens to a common ocular, located half way between the two instruments. The field is divided into halves, and the images of the specimens appear simultaneously and immediately adjacent in the field. Each microscope may be focused independently within reasonable limits with the fine adjustment. The

device is comparatively expensive, but may be of considerable value where many comparisons must be made at fairly high powers. Fig. 9 shows a low-power comparison microscope for the same purpose.

To enable two persons to use the same microscope at the same time, a demonstration eyepiece is of most value for instruction purposes rather than ordinary work. A small pointer is provided so that the instructor may point out parts of the image which are of special interest or importance (Fig. 10).

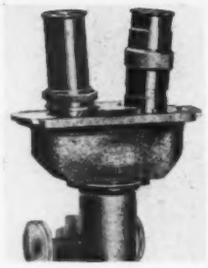
Binocular Eyepieces

It is not always easy for a person not making continuous use of a microscope to become accustomed to making his observations with both eyes open. If one eye is closed, the muscles are strained, and the observer becomes fatigued. For such a case there are obtainable binocular eyepieces (Figs. 11 and 12). These slip into the draw tube in place of the regular ocular, but are provided with two tubes containing matched oculars—one of which is independently focusable to correct for any difference between the eyes of the observer. With this arrangement both eyes are used, and less trouble is frequently experienced.

In the type of eyepiece employing parallel tubes, some difficulty may be experienced in getting a "single" image. This is due to lack of accommodation, and the user must practice until he finds the correct spacing of the tubes for his eye-span, and also the proper eye-point (distance from upper lens to the eye) to employ. The slightly coverings type of tubes are somewhat easier to use.

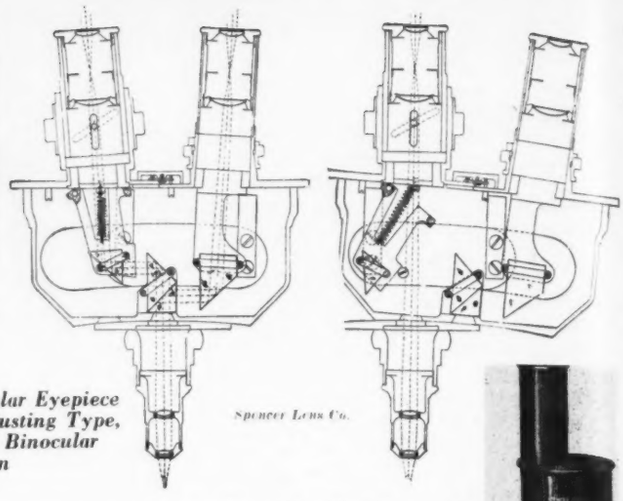
The binocular eyepiece does not make the microscope stereoscopic, although many observers will be found who claim to notice a psuedo-stereoscopic effect. To obtain this result in actual fact, two objectives as well as two oculars must be employed, and must be properly adjusted in relation to each other. Most of the higher-priced microscopes are now equipped with interchangeable monocular and binocular bodies working with a single objective.

The Spencer Lens Co. has developed a binocular body which contains an ingenious system of prisms (Fig. 13 *a* and *b*) so arranged that the body may be swung aside so that the prisms are removed from the optical system and the instrument becomes monocular. The adjustment is practically instantaneous and all equipment for either type of observation is always on the microscope. The binocular arrangement is seldom employed as a permanent feature alone, since it is not so well suited for projection and photographic work. Thus the improved form just mentioned will be found convenient.



Spencer Lens Co.

Fig. 12. Binocular Eyepiece



Spencer Lens Co.

Fig. 13a. Binocular Eyepiece of New Self-Adjusting Type, Arranged for Binocular Vision

Fig. 13b. The Same Arranged for Monocular Vision

Spencer Lens Co.

Fig. 14. Erecting Eyepiece for Dissecting Work

Light Filters

A very useful aid to ordinary direct observation through the microscope will be found in a set of filters consisting of specially prepared gelatin film, stained with carefully selected dyes and mounted between thin-glass disks of the correct diameter to be used in the substage of the microscope. By this means, substantially monochromatic light may be employed for the examination of stained (particularly double-stained) samples.

Thin fabrics are very satisfactorily examined by two-color illumination. For example, a blue filter may be used in the substage, while a red, green, yellow, or other colored filter may be used with an illuminator so arranged as to light the object from above. With this system in use wherever the sample is transparent or where there is an open space between yarns the goods will appear blue. Wherever the material is opaque due to coating etc., the cloth will appear of the second color—and usually of a contrasting hue. Thick yarns which cannot be examined with satisfaction by the usual methods of differential illumination (Article IV) can be successfully shown in color against a complementary background. The application of filters as accessories to photomicrography will be taken up in the proper place later.

For dissection of fabrics, difficulty may be experienced in working with the ordinary microscope, since the directions or motion as seen through the instrument are reversed. This makes the required operations clumsy and uncertain, as well as slow. To do away with this objection, an erecting eyepiece (Fig. 14), which restores the image to its proper position and makes the motions of the instruments appear as they really are, can be obtained. It should be mentioned in this connection that where projection can be used, as on paper, screen, or Euscope, the direction of motion as viewed will be correct.

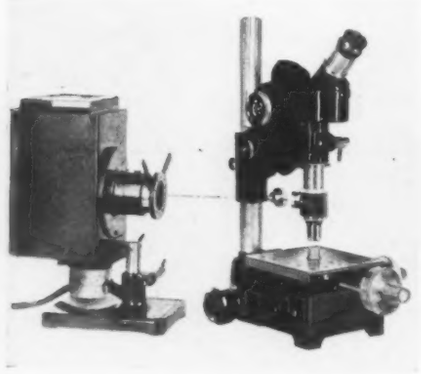


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Fig. 15a. Toolmaker's Microscope Arranged to Examine Spinneret

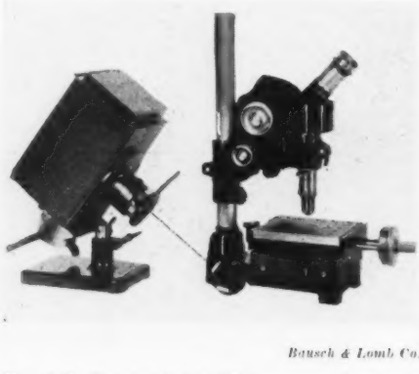

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Fig. 15b. Toolmaker's Microscope Arranged for Inspection of Spinneret Drills (Here Measuring Diameter of Spinneret Gauge)

Toolmaker's Microscope

A toolmaker's microscope may be adapted to the inspection of textile equipment — particularly for rayon spinnerets and the fine drills used in making them. Such a device is shown in Figs. 15*a* and 15*b*. Ninety-degree cross-hairs in the eyepiece serve as reference or base lines and remain stationary while the spinneret can be moved in two directions at right angles with each other simultaneously if desired. Thus two dimensions can be quickly determined. Measurements can be read directly in .001 in. on two micrometer heads in the base of the instrument, and even smaller intervals may be estimated. Means are provided for lighting the sample from above by

a vertical illuminator (Article IV) and by transmitted light from below through a green filter and a system of mirrors.

By means of a simple and ingenious arrangement of illuminants, the ordinary binocular stereoscopic microscope can be adapted to the rapid inspection of spinnerets by either direct or transmitted light or both (Article IV).

Micro-Analyzer

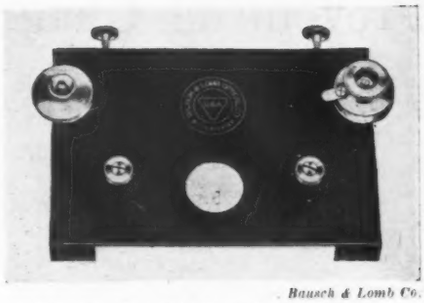
Still another arrangement of the stereoscopic instrument is offered in the Cruger Micro-Analyzer (Fig. 16). This is particularly suited to the determination of yarn count in fabrics, examination of cloths for defects, and weave analysis. The operation is simple, and in the case of transparent objects, the sample is placed on the glass *A* and covered with the desired size of diaphragm (one is shown at *E*). It is then clamped in place by clips 8. To provide ready access to plate *A*, the mount carrying the microscope may be tilted upward to the left about pivot *D*. After closing hood *C*, which cuts off the light from screen *B* but leaves *C* open, the light is turned on and the microscope brought into position by means of screw heads 1 and 2.

The instrument is focused as usual. If light from above seems desirable, hood *C* may be opened to any convenient extent. A cross-hair in the microscope eyepiece furnishes a reference line for making yarn counts. A stop makes it impossible to cover more than the desired distance. Obviously with this arrangement both warpwise and fillingwise counts may be made without changing the position of the sample. If it is not desired to have any light sent through the sample from below, an opaque plate may be placed beneath the sample *C*. With the hood *C* raised, very satisfactory direct illumination is obtained.

Some idea of the possibilities of the instrument in the determination of fabric structure is shown by Fig. 17, while the initial steps in the dissection of fabrics as they appear under the instrument are shown in Figs. 18 and 19. In the latter view the interlacing of the yarns at the right have been picked out for recording on design paper.

Yarn-Carrying Stage

Where continuous lengths of yarn are to be inspected for irregularity or changes in structure or dimensions, it is necessary to have a convenient means for passing the yarn across the stage of the microscope and at the same time keeping it in the center of the field. Such a device is shown in Fig. 20, and is simply a supplemental stage attached to the regular microscope stage, and carrying a tension device, pulley, and guide, so that yarn may be wound continuously across the stage from one spool to the other.



Bausch & Lomb Co.

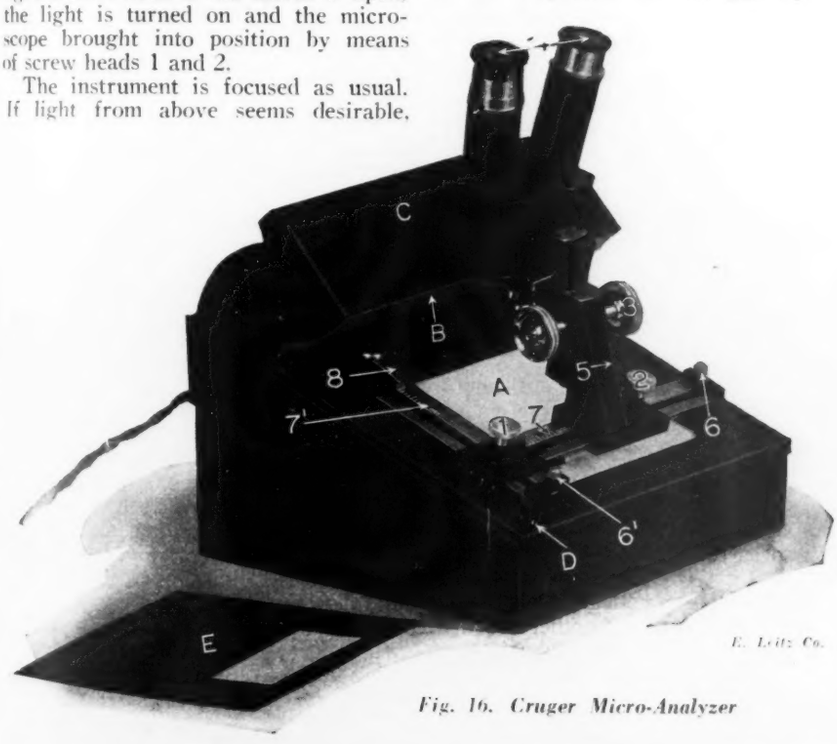
Fig. 20. Special Yarn-Carrying Stage for Microscope

Other necessary devices of major importance, such as microtomes, cameras, etc., will be described in later articles when the matters of sectioning, photographing, etc., come up for discussion. Smaller devices will also be described as their use brings them into the later topics to be developed.

Many New Devices

With the continued application of the microscope to textile work, new pieces of accessory equipment will constantly be brought out and new applications of devices already known in other fields of microscopical research will be adapted to the problems which are peculiar to textiles.

Many instruments may be devised by the reader to meet his special requirements, and the field of usefulness of the microscope may be markedly broadened by the intelligent use of the apparatus now available or by the design and constructing of new apparatus. One fact should never be lost sight of, nor forgotten: Not only will accessories be provided for the microscope, but the microscope itself may be considered an accessory to the usual apparatus for physical and chemical research on textiles.



E. Leitz Co.

Fig. 16. Cruger Micro-Analyzer

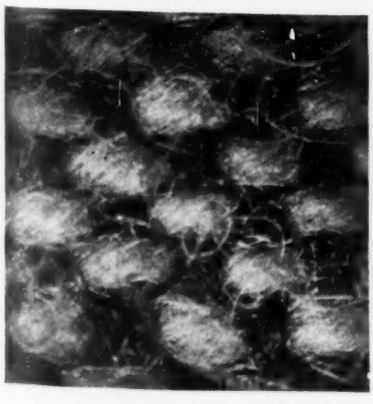


Fig. 17. Fabric as Seen Through the Instrument

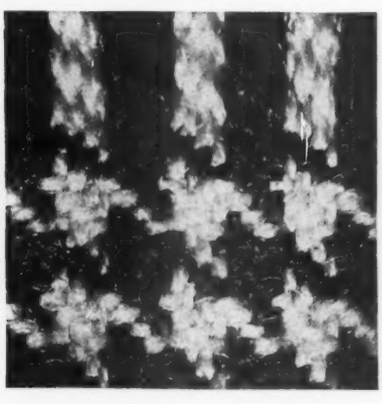


Fig. 18. Weave Analysis by Inspection

Fig. 19. Analysis by Micro-Analyzer Showing Initial Stages of the "Pickout"

Preventing Chafing of Rayon Yarn

By Periodically Inspecting and Recording Condition of Guides

By H. S. E.

A RUPTURE of some of the fine filaments of which a rayon thread is composed will cause a whiskery, fibrous appearance of the finished product—a condition that materially impairs its quality. In the case of yarns plied for sewing, etc., as a substitute for silk, the chafed portions are particularly undesirable in that they weaken the thread.

These broken filaments are brought about chiefly through contact with rough, sharp, or channeled surfaces whose cuts are smaller than the diameter of the denier being run. Especially is the foregoing true when there is also the accompanying fault of too much tension, which itself is often heightened by too great an angle for the yarn, and a high speed.

Fig. 1 shows a common guide with a channel cut at the part *c* where the yarn makes contact with it. It will be readily understood that the material is going to be damaged if it is forced to run along the channel made by a finer denier.

Periodic Inspection

To eliminate such cuts or channels, or other faulty conditions of guides, rods, and other surfaces, it is essential that a rigid scrutiny of each guide and bearing surface with which the rayon comes in contact be made periodically. The periods should be frequent enough to prevent any damage to the goods taking place between inspections. Tabulating the results of inspections made at close periods will soon give a fairly good idea of the frequency required.

In addition to the periodic going-over, there should also be a special inspection when changing from one denier to another, especially where the change is to a radically coarser count.

When ply yarns are twisted on machines using rings and travelers that are common to cotton and wool, great care must be exercised to see that the travelers are changed frequently to avoid cuts. Also when changing from a certain denier to one slightly heavier —a move sometimes made without changing travelers, as a matter of economy—care must be taken to see that the travelers are not so old that they have become channeled. Such travelers tend to fray the yarn.

Rings Must be Burnished

Moreover, in this type of twister it is essential that the rings be kept well burnished, since any corrosion will help to retard the traveler at starting time, morning and noon. This causes stretching and may result in partial rupture of the strand, occasionally even causing complete rupture.

"It Pays to Scrutinize"

Compensator guides, subject as they are to innumerable strains and jerks, should be closely watched and renewed when showing signs of cuts. Indeed, every wire, rod, guide, or surface, of whatever material, over which the rayon runs should come in for the suggested periodic scrutiny. "It pays to scrutinize" would make a good slogan for concerns working on rayon.

While it is usually advisable to renew guides, etc., when cut, there are sometimes occasions when, for reasons of economy, the same units—if of metal—may be put into good shape again if the indentation is slight. Fine emery cloth and oil, with a finishing touch of leather, will do a good job. Obviously only a trusted person should be given the work of using the emery cloth, since a careless person can make a bad matter worse by leaving emery scratches.

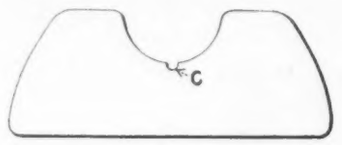


Fig. 1. Channeled Yarn Guide

Rods and wires may sometimes be advantageously turned or moved laterally so as to present a fresh surface to the rayon. This is a good stunt to carry out where practical, as it saves the cost of renewal. Another worthwhile pointer in working rayon is not to renew a wire or guide here and there on a side, but rather to renew one whole side or machine and then to use the best of the left-overs for renewals on other machines. Records of renewals will be more easily kept track of in this fashion and the danger of uneven wearing escaping attention and causing damage will be materially lessened.

Overseer's Book

Experience in other textile fibers has taught that it is not good management to leave the matter of following up and changing the nicked guides and rods entirely to the section-hand. The overseer should have a special loose-leaf sheet or a book ruled to cover each machine in each section-hand's place, and this book should be turned in to the overseer's office weekly or monthly, as the arrangement may be, so that he can keep tabs on what is going on. A permanent record which can be referred to in the future is thus assured, and a handy thing it will prove to be.

Fig. 2 shows a record sheet that has given good service and will be found efficacious by any firm that wishes to try it—the understanding being of course that it is flexible and that any changes or interpolations may be resorted to which will in any way serve to make the inspection more effective.

Where the span of time for inspection stretches to something like two or three months, it is a good plan—if the section-hand does the examining—to do a few frames weekly, rather than to lump the work, since the latter procedure throws too much work on the section-hand at one time, with the consequent possibility of his slighting the inspection because of lack of adequate time.

It is better to do it as follows: Assume that there are 48 machines on a section and that there is a tri-monthly inspection period. This would be about four machines per week, and these four could be spread out over the week; i.e., one Monday, one Tuesday, and so on. By working in this way, the time required for looking over the guides and rods is comparatively small daily, and the inspection is always in mind. Furthermore, it obviates the chance of having all the surfaces going bad at one time.

WEEKLY GUIDE INSPECTION

MACHINE NUMBER	INSPECTED DATE	GUIDES RENEWED		REMARKS
1				
2				
3				
4				
5				
6				
7				
8				
9				

Fig. 2. Permanent Record Sheet for Guide Renewals

THE PERSONAL PAGE

J. A. **Cason,** president of the Georgia Knitting Mills, Barnesville, Ga., has recently been elected mayor of that city.

Robert **Eppes** was reelected president of the Charleston (S. C.) Cotton Exchange, at the annual meeting of the organization last week.

G. W. **Hundley,** president of the Golden Belt Mfg. Co., Durham, N. C., has been elected president of the Tin Decorating Co., Baltimore, Md. Mr. Hundley will continue as president of the Golden Belt Mfg. Co., dividing his duties between the two concerns.

Charles **Seidman,** president of the Seidman Braid and Fabrics Corp. has arrived in Huntsville, Ala., from New York. He will have charge of the installation of the remainder of the machinery for the braid mill that his corporation is moving here and which is expected to be in operation within the next few days. Plans are under way for the training of all help so that the plant will be in full operation by the first of December.

A. F. **Hobbs,** president of the New York Mills (N. Y.) Corp., was last week elected a director of the Utica Mutual Insurance Co.

Dennis D. **O'Connell,** proprietor of the Sterling Worsted Mills, Worcester, Mass., and Mrs. O'Connell left on Sept. 12 for a month's trip to San Francisco, Cal., and the Pacific coast.

Phil **Steel,** Mauney-Steel Co., Philadelphia, sailed for Europe, Aug. 31, planning to be away from his office for six weeks. While abroad Mr. Steel will visit his son who is now making his home in Germany, where he is one of the leading operatic singers.

F. **Cuppen,** of Ede, Holland, connected with the engineering department of the American Enka Corp., accompanied by his wife, have arrived in Asheville and are stopping temporarily at the Vanderbilt hotel until their residence in Enka is completed. Mr. Cuppen was among the first representatives of the Enka Corp. to come to this country and was superintendent of construction on one division in erection of the plant. He left Asheville about a month ago to return to Holland and bring his wife to this country. Mr. Cuppen has been connected with the Enka Corp. for some time, having been an executive of the corporation at the Arnheim, Holland, plant.

Vaughan **Jealous,** formerly with the American Woolen Co., later with Francis Willey & Co., Inc., and now in business for himself, was recently married to Miss Anne Craig Forbes of Brookline, Mass.

W. D. **Watkins,** formerly with Stonecutter Mills Co., Spindale, N. C., but for the past two years connected with the Wachovia Bank & Trust Co., Raleigh, N. C., has accepted a position with Burlington (N. C.) Mills, Inc., and other plants in the Love-Smith group.

Paul H. Wilson, secretary of the Graton & Knight Mfg. Co., of Worcester, Mass., spoke on "Calendar Reforms," before members of the Norwich Chamber of Commerce at its annual outing at Gardner Lake, Norwich, Conn., on Monday, Sept. 16.

S. E. Kent will succeed **Walter T. Dwyer** as manager of the Dallas office of Pacific Mills. Mr. Kent formerly was connected with the office of the Pacific Mills in St. Louis.

G. Guy Jeter, for 16 years with the Pittsfield (Mass.) Works of the General Electric Co., has become manager of power apparatus sales of the General Electric Supply Corp., Bridgeport, Conn.

Fred A. Knopp, who for the last 17 years has been agent for the Mt. Hope Finishing Co., has resigned.

Arthur O. Roberts has resumed his duties at the Amoskeag Mfg. Co., Manchester, N. H., as acting agent, following his vacation. Active management of the plant is divided between Mr. Roberts and Henry Rauch.

H. Gilbert France has resigned as assistant to the agent of Pacific Mills, Lawrence, Mass., and has opened an office in the Park Square Building, Boston, as general consultant on labor relations. He will continue to supervise industrial relations for Pacific Mills as heretofore. In addition to his experience at the Pacific Mills, he has served as employment manager for the Boott Mills, Lowell, Mass.

H. V. McClennan will rejoin the U. S. Finishing Co. on Oct. 1, when he will be located in the New York headquarters of the company. Mr. McClennan until a few years ago was located at the central office of the company at Providence, R. I. He then became treasurer of the Slater Co., Inc., which position he is now resigning.

Col. F. C. Deacon has recently been elected to the board of directors of the Monarch Knitting Co., Ltd.

Pierce Williams, formerly of Griffin, Ga., who has been connected with the Wiscassett Mills Co., at Albermarle, N. C., has been selected to go to Melbourne, Australia, where he will instruct the operatives in a company to run full-fashioned knitting machines. He will sail from Vancouver, on Sept. 18, and will be gone for six months or a year.

Walter D. Stearns, formerly connected with the works manager's department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Penn., has been made assistant manager of personnel of the duPont Rayon Co., Buffalo, N. Y.

Thomas H. Hagan, vice-president of the Textile Development Co., Boston, Mass., has just returned from Europe, where he has been since last December in charge of a large staff of cotton experts who have made surveys of eleven textile mills located in Germany, Switzerland, Austria, Czechoslovakia and Jugo-Slavia.

Walter Fleming of the Crompton & Knowles Loom Works, Worcester; **John Hampton** of the Intervale Mills, Webster; **George Simmons** of the Graton & Knight Mfg. Co., Worcester, and others took part in discussions on certain phases in business at the dinner of the Worcester Chapter, National Association of Cost Accountants at the Bancroft Hotel, Worcester, Mass., on the night of Sept. 12.

Russell C. Young is now located with the Boston office of Borne Scrymser Co., representing to the New England Trade, "Breton Minerol" process and their other specialties for textile manufacturing.

Al Smith, who has been assistant designer at the National Weaving Co., Lowell, N. C., has resigned to accept the position as head designer at a plant in Shelby, N. C.

Robert Brice, of the Draper Corp., Hopedale, Mass., is stationed at the new southern warehouse nearing completion at Spartanburg, S. C.

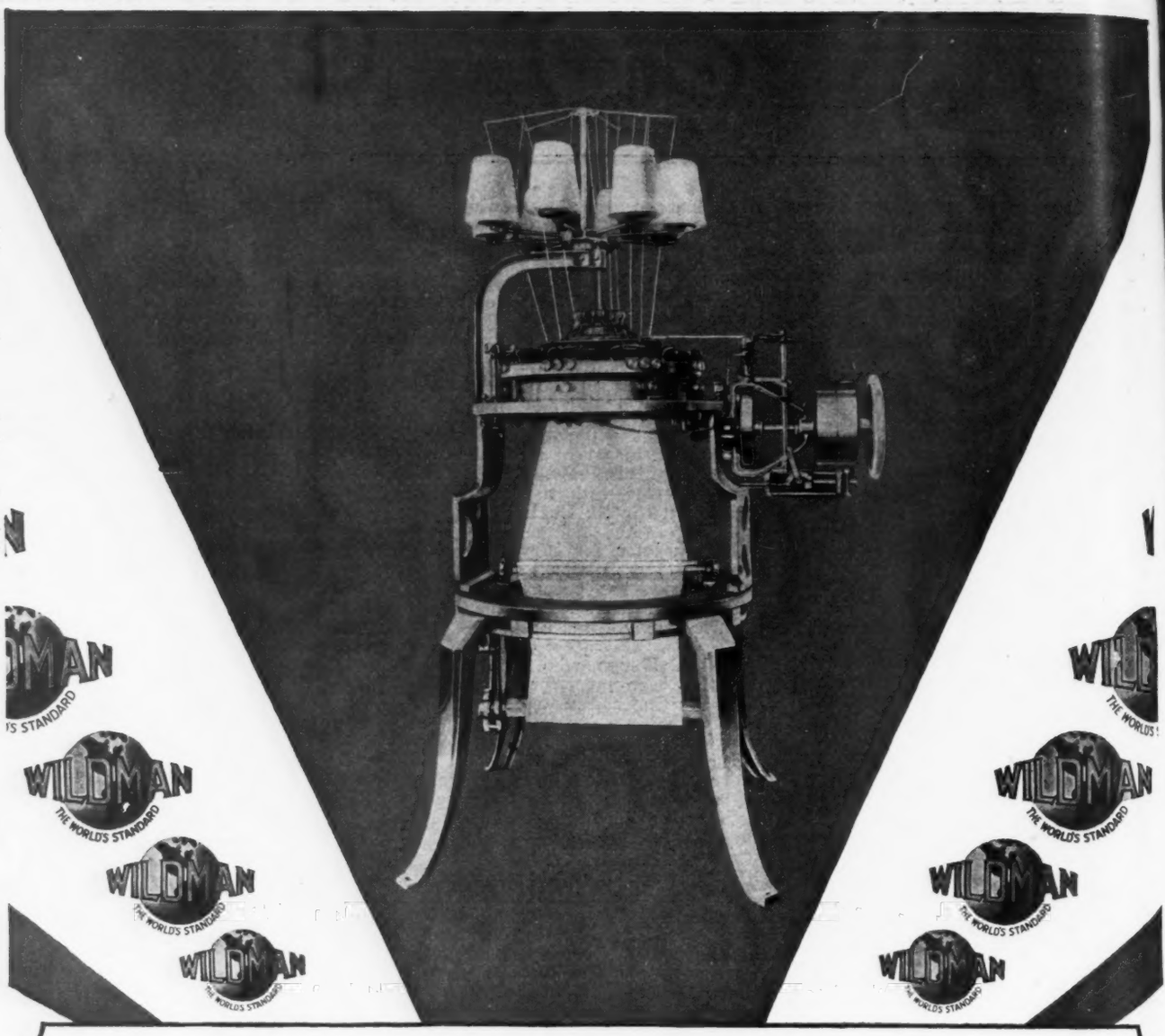
Dr. Wallace Cohoes, New York, N. Y., was severely injured at the Lewiston (Me.) Bleachery & Dye Works, where he was inspecting a dyeing machine invented by himself.

Roy A. Cheney, secretary of the Associated Knit Underwear Manufacturers of America, Utica, N. Y., has secured temporary quarters on the sixth floor of Mann Building, New York. Mr. Cheney stated that the offices will be moved to New York City, possibly this fall, although no definite time has been set nor any location been decided upon at the present time.

J. W. Vanderhooven, secretary of the American Enka Corp., Enka, N. C., was one of the principal speakers at the annual meeting of Group Ten, North Carolina Bankers' Association, held recently at the Hotel Skyland, Hendersonville, N. C., his topic being "What Rayon Is."

Major D. Hallam, secretary of the Canadian Woolen and Knit Goods Manufacturers' Association, who has been seriously ill following an operation, is now fully recovered and will be able to renew his activities with the association.

John F. Tinsley, general manager of the Crompton & Knowles Loom Works, Worcester, Mass., is chairman of the finance commission of the Worcester



The Wildman Body Machine produces
Rayon Body Material that is right

WILDMAN MANUFACTURING CO.
Norristown. Pa.

WILDMAN
THE WORLD'S STANDARD

WILDMAN
SPRING NEEDLE BODY MACHINE

Chamber of Commerce which will raise a special revenue fund to increase the present income of the chamber from $67,000 a year to $85,000. Six thousand dollars would be raised by dues and $12,000 by a yearly voluntary sustaining fund through the new plans of the commission.

Edwin L. Lyon has accepted the position as superintendent of weaving for the Whitman Mills, New Bedford, Mass. Mr. Lyon comes from Pawtucket, R. I.

Winfred W. Windle, assistant superintendent of the W. W. Windle Co., Millbury, Mass., returned on the S.S. "Bremen" on Sept. 10 from a European trip.

William J. Hines, Jr., superintendent of the wool department at the Bigelow-Hartford Carpet Co., Thompsonville, Conn., and Miss Helen M. Conley were married on Sept. 12. Mr. Hines' father has been wool expert for the Bigelow-Hartford Carpet Co. for many years.

Arthur Snow, formerly connected with the Esmond (R. I.) Mills has accepted a position as consulting superintendent for the Roanoke Mills Nos. 1 and 2, and the Rosemary Mills, Roanoke Rapids, N. C.

G. R. Krause has taken the position as superintendent of weaving, dyeing and finishing for Faulkner & Colony Mills, Keene, N. H. He was formerly with the Roubaix Mills, Clinton, Mass.

Frank E. Heymer, formerly superintendent of the Eagle and Phenix Mills, at Columbus, Ga., has returned to Egan, Ga., where he has resumed his position as superintendent of the Piedmont Cotton Mills. Mr. Heymer was superintendent of the Piedmont mills nine years ago.

L. W. Green, formerly superintendent of the Atlantic Cotton Mills, at Macon, Ga., has resigned to accept the position of superintendent of the Barrow County Cotton Mills at Winder, Ga.

D. **F. Herring** has been appointed superintendent of the weaving department of the Samoset Cotton Mills, Talledega, Ala.

J. **L. Brannon,** formerly superintendent of two mills of the Alabama Mills Co., is now superintendent of the Barrow County Cotton Mills, at Lawrenceville, Ga.

Alfred Hoffman, formerly with the Onyx Hosiery, Inc., Passaic, N. J., has been appointed supervisor of the full fashioned hosiery department of Eastern Hosiery Mills, Ltd., Truro, Canada.

Harold C. Kelley, for the past 12 years connected with the Manville-Jenckes Co. and its predecessor, the Manville Co., has resigned his position as overseer of carding at the Manville, R. I., mill to accept a position as superintendent of carding at the Androscoggin Mill of the New England Textile Corp. at Lewiston, Me. Mr. Kelley will be succeeded at the Manville mill by his assistant, **Arthur Nutall.** Associates of Mr. Kelley at the Manville plant presented him with a wrist watch and a stop watch at the conclusion of his duties.

W. W. Goforth has resigned as pay master and shipping clerk at the Victor-Monaghan Co., Greenville, S. C., and has gone to Gaffney, S. C., where he has entered business.

Sam Settle will be in charge of the reclaiming plant of the Goodyear Tire & Rubber Co., at Gadsden, Ala. He formerly was general foreman of the reclaiming plant at Akron, Ohio. The Gadsden plant will be put in operation soon.

George C. Hall, foreman for the Graton & Knight Co., Worcester, Mass., has been transferred to Philadelphia, where he will represent the company.

J. L. Townsend has resigned as teacher in textiles at the Chester (S. C.) High School to accept a position in the office in the Whitmire (S. C.) plant of the Aragon-Baldwin Cotton Mills, Inc.

George V. Edwards has accepted the position as overseer of carding for S. F. Scott & Sons, Uxbridge, Mass. He was formerly employed with the Uxbridge (Mass.) Worsted Co.

J. Thompson from Germantown, Pa., has taken the position as overseer of spinning for the Asbestos Fibre Spinning Co., No. Wales, Pa.

Harris Midwood, foreman of finishing for the Georges River Woolen Mills, Warren, Maine, has resigned his position with that company.

S. E. Lancaster, overseer of finishing for Harris-Emery Co., Penacook, N. H., has resigned his position with that company.

Eugene Franks is now head of the weaving department at the Judson Mill, No. 2, Greenville, S. C.

Lowell City Council Provides Textile Scholarships

LOWELL, MASS.—The City Council has passed an ordinance providing for the establishment of scholarships at the Lowell Textile Institute, for which Lowell students will be eligible. Two scholarships are to be provided each year, furnishing tuition to their holders for four years. The ordinance was drawn up on petition of Hugh F. Downey, a member of the School Committee.

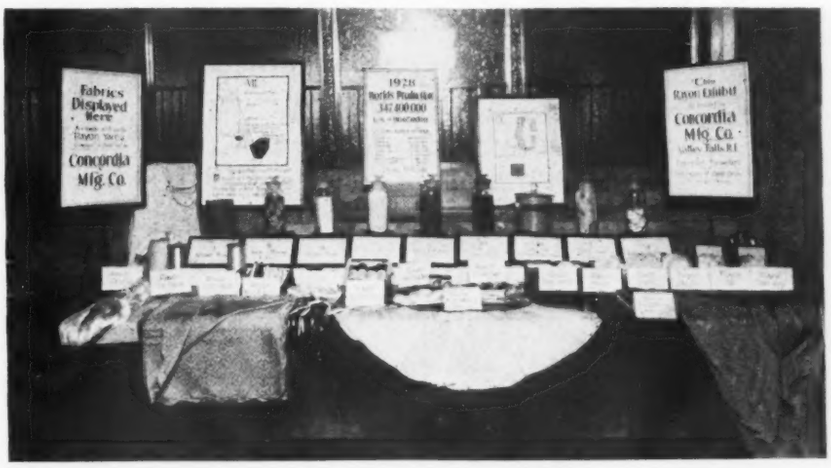
Ask Dean Nelson to Re-Value Spindles of Wake County, N. C.

SPARTANBURG, S. C.—The commissioners of Wake County, N. C., have authorized Professor Thomas Nelson, dean of the textile school of the North Carolina State College, to make a revaluation of the spindles of that county. The mills recently protested against a valuation of 27c. per spindle that had been fixed by the county commissioners. They are contending for a re-valuation at 15c. per spindle. Professor Nelson's appraisal will be subject to approval of the commissioners.

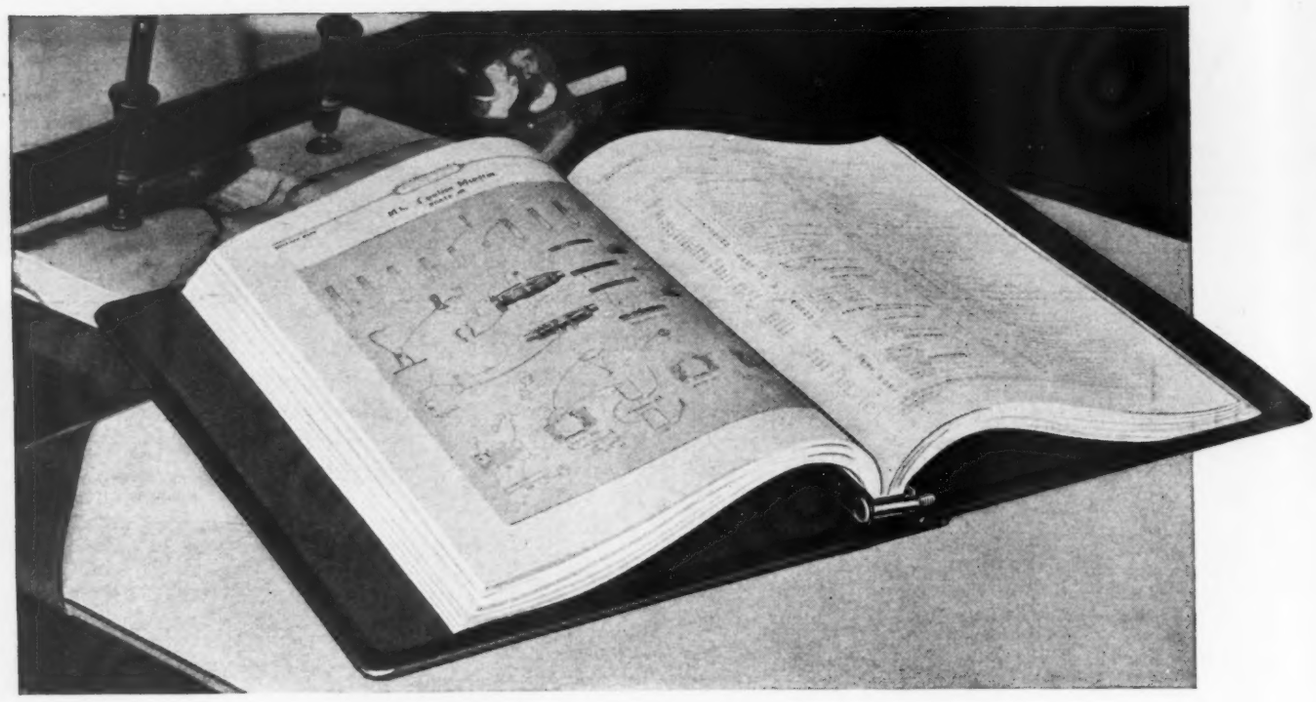
To Re-equip the Hill and Androscoggin Mills

Between $1,000,000 and $1,500,000 will be expended in re-equipping the plants of Androscoggin Mills and Hill Mfg. Co., cotton goods, Lewiston, Me., according to a statement made by Walter S. Wyman, president of the New England Public Service Company that controls these mills. This decision was arrived at by the New England Public Service Co. following a survey of the physical condition of both plants by George E. Spofford, their treasurer, the latter being authorized to go ahead and make these changes as rapidly as possible.

AN INFORMATIVE RAYON EXHIBIT



Rayon Exhibit by Concordia Mfg. Co., Valley Falls, R. I., in Lobby of Industrial Trust Co., Slater Branch, Pawtucket, R. I.: The display showed rayon manufacturing from spruce wood to finished yarns, also converted forms of rayon and fabrics made wholly or partly of rayon. Its interesting and educational nature has prompted the sponsors of the display to send it to other textile centers where rayon is used extensively.

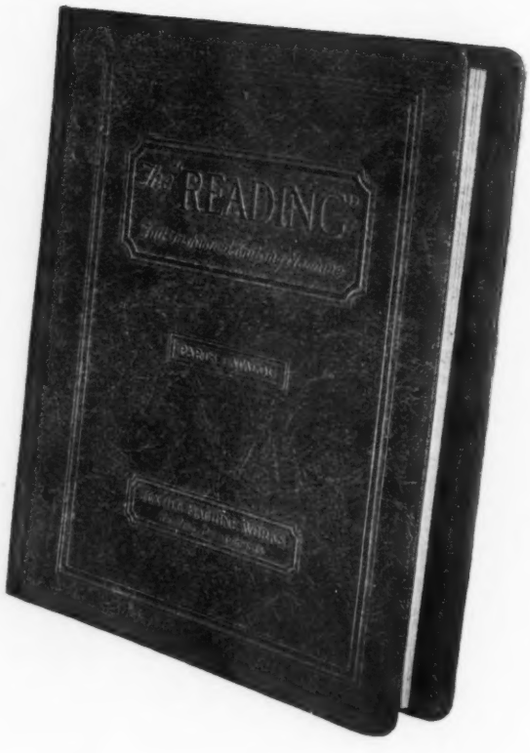


—just off the press

It has been a tedious undertaking — this Parts Catalog. Aside from illustrating and describing every original part of Reading machines it contains as well a complete treatise on the operating principles of all the various parts, motions and mechanisms... Over a year in the making! But the work and expense involved are well worthwhile when we consider how much this volume will mean to Reading owners.

A glance at the index, a flip of the pages — and there's the part you need in a hurry. No mistakes, no delays.

Every owner of Reading Full Fashioned Knitting Machines is entitled to a copy of this comprehensive catalog *gratis.* Write for yours today. Additional copies three dollars each.



TEXTILE MACHINE WORKS

Dept. T

READING · PA ·

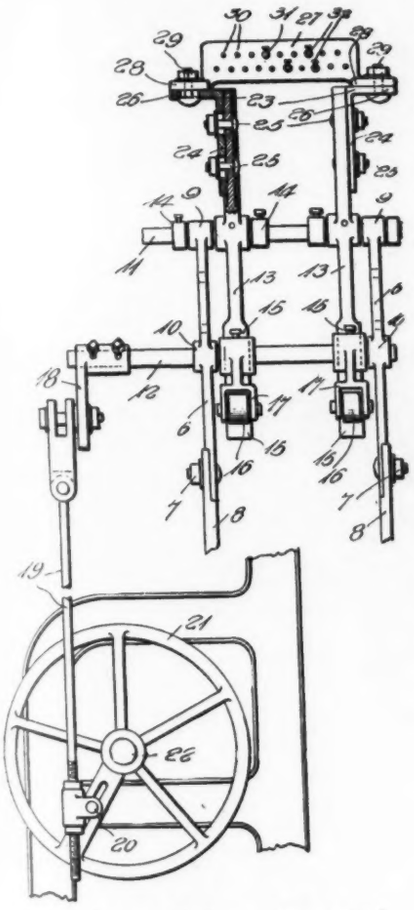
See also CONSOLIDATED TEXTILE CATALOG

NEW MACHINERY & PROCESSES

Leno Jumper Attachment

Simple, Inexpensive, and Applicable to Any Make of Loom

A new jumper motion for operating the bottom shed or cross yarn in the weaving of leno has been developed by Elmer J. Tetreault, 248 Osborn St., Fall River, Mass. The new device is simple and may be readily applied to any make of loom. It is designed to operate without either strain or vibration, and consequently without great wear and tear. It is said to be comparatively inexpensive.



Leno Jumper Motion as Seen From End of Loom

The accompanying diagram shows the attachment as seen from the end of the loom. The numerals 6 denote two vertical bars whose lower ends may be secured by bolts 7 against the inner side of a dobby head frame 8. The bars 6 are provided with upper and lower bearings 9 and 10, in which upper and lower horizontal shafts 11 and 12 are mounted.

Two parallel vertical levers 13 are fulcrumed upon the upper shaft 11. Appropriate collars 14 are employed. The lower ends of the levers 13 are provided with straight track portions 15 contacting with rollers 16 carried by two arms 17, which are secured to the shaft 12 by set screws. A crank 18 is secured to one end of the shaft 12, and is connected by an appropriate pitman 19 with a wrist pin 20 on a fly-wheel 21. The fly-wheel is secured upon the top loom shaft 22.

At the upper end of the levers 13, two brackets 23 are provided, each being of inverted L-shape. The vertical portions 24 of these brackets are secured by bolts 25 to the upper ends of the levers 13.

A horizontally elongated plate or bar 27 extends between the upper ends of the levers 13 and is placed in substantially a vertical plane. The ends of this bar are provided with feet 28 secured by bolts 29 to the bracket portions 26. This bar 27 is provided with a number of small openings 30, through which may be passed practically any desired number of harness actuators 31. These actuators are preferably in the form of wire rods. Collars 32 may be secured upon these rods.

As the loom is operated, pitman 19 is reciprocated and through the medium of the crank 18, it oscillates the rock shaft 12. The arm-carried rollers 17 of this rock shaft act upon the track portions 15 of the levers 13, smoothly oscillating the levers 13 without jerky motion. Oscillation of these levers causes inward and outward movement of the bar 27 to operate the harness actuators 31.

Slight modification of the mechanism as described herein is necessary for certain types of looms

Cloth-Finishing Guider

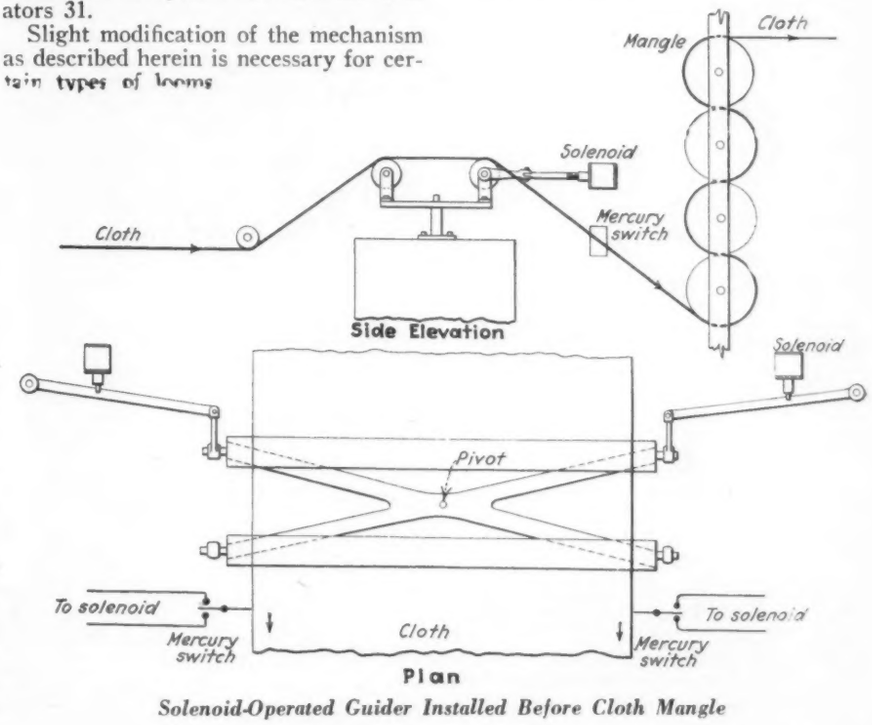
Pivoted Rollers Controlled by Solenoids Center Cloth

*By E. C. Phillips**

When finishing cloth, it is necessary to provide some method to keep the cloth entering the machine in the proper position. To do this, the cloth is passed over two rolls mounted in a cradle which is so pivoted in the center that the position of the rolls can be changed slightly, bringing one end near the machine. The cloth then has a tendency to move toward the end farthest from the machine. When the cloth reaches the center, the position of the rolls is changed, bringing them parallel to the machine—or the process is reversed when necessary.

The Great Barrington (Mass.) Mfg. Co., at first made this adjustment by hand and it had to be watched constantly. Then the plant engineer installed two solenoids working through suitable link motions for making the adjustment automatic. One solenoid is mounted at each end of the rolls as shown in the accompanying photograph, the solenoid being operated through a mercury switch which is mounted near the edge of the cloth at the point where the latter enters the machine. There is a feeler so placed that a slight movement of the edge of the cloth will trip the proper

*General Electric Co., Boston, Mass.



Solenoid-Operated Guider Installed Before Cloth Mangle

Crown Brand Rayon Yarns

ARE EVERYBODY'S BUSINESS

THE VISCOSE COMPANY is the world's largest producer of rayon. Every year's output of CROWN Brand Yarn exceeds by millions of pounds the total production of all other manufacturers in this country.

This is success. Made possible only by the contributing successes of many factors. Crown Brand Rayon Yarn has met the needs and bettered the standards of the industry. Its case rests not on seven-league leadership in sales, but on unvarying reports of profit and good-will—from the customers of our customers on through to the ultimate consumer. Its service now is a guarantee of greater things in the future.

Crown Brand Rayon Yarns are satisfying the call of fashion for things entirely new. They are today's standard of quality in more than twenty types and sizes of yarn. True to denier, exactly even, free from defects, easily worked, clear dyeing, perfectly suited to their many uses. Their finish is permanent. They are washable, sunfast and long-wearing. Their performance is certain.

New Crown Brand Yarns now in work will extend the field of rayon—raise its style standing—further the success of all factors in the trade. Visitors are always welcome at any of our sales offices. Come to headquarters now for next year's rayon news. . . . The Viscose Company, 171 Madison Avenue, New York City.

THE 1928 DISTRIBUTION OF CROWN BRAND RAYON YARNS BY USES

Figures are pounds

Underwear	17,820,000	Silk Goods	7,020,000
Hosiery	9,720,000	Wool Goods	540,000
Other Knit Goods	2,160,000	Braids, Elastics, etc.	3,240,000
Cotton Goods	10,800,000	Miscellaneous	2,700,000

Estimated output for 1929—66,000,000 *lbs.*

It is significant that increasing numbers of manufacturers are so proud of results obtained with Crown Brand Rayon Yarns that they are using this crown on their own labels to identify their products. We restrict its use to high-type textiles and well styled quality merchandise. It is assurance of lasting merit.

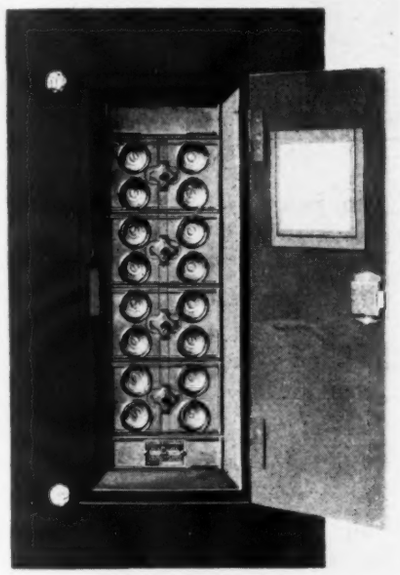
MADE OF CROWN BRAND Rayon Yarns

solenoid into action, thus changing the position of the guider and bringing the cloth to the proper position. It was found necessary to introduce a spring between the guiding roll and the solenoids to allow the plunger of the solenoid to seat and thus to reduce the current. This spring action also gives smoother movement to the rolls.

Slim Lighting Panelboard

Over-all Width of 12 In. Allows Use In Narrow Places

With the introduction of a full line of new narrow lighting panelboards, the Square D Co., Detroit, Mich., adds another product to its line of electrical-



Narrow Lighting Panel-Board with Four Plug-Fuse Sections; Safety Door Open

control equipment. The Square D Co. united several months ago with the Industrial Controller Co., Milwaukee, Wis., and at its factories at Detroit, Milwaukee, and Peru, Ind., now manufactures a complete line of electrical control equipment.

The new narrow panelboards are said to possess every advantage of the standard line. The fact that these new boards are only 12 in. wide over-all (6-in. panel and 3-in. gutter all around) allows them to be used in places where a larger panelboard could not be conveniently installed—on supporting steel girders in factories, for example. They are claimed to meet every requirement up to 100-ampere capacity, yet they are small and neat. They are made complete with all copper bus-bars of standard capacity; and they can be supplied with cartridge fuses, as well as plug fuses. Switched circuits, as well as fuses only, can be supplied in the branches.

There are six different wiring combinations possible with the Square D narrow panelboard. Other features, contained also in Square D standard lighting panelboards, include all molded parts of genuine Bakelite; durable olive-green Duco finish; sectional construction with all sections mounted on channel-irons; trim clamps; and chromium-plated hardware. Spring-catch locks are standard equipment. Where both switches and fuses are supplied, the switches are of the tumbler type, heavy duty, 30-ampere, 250-volt rating, as in the standard panelboard. Mains are of 30- to 100-ampere capacity. The branches are all 30-ampere. The number of branch circuits obtainable in these panelboards ranges from 4 to 32.

Meter Service Breaker

Positive Circuit Breaker Allows Temporary Overload

The Westinghouse Electric & Mfg. Co. announces the development of a positive automatic circuit breaker in the WK-50 meter service breaker. This new breaker is said to be safer than fuses because its performance cannot be easily altered by adverse conditions. Because of its longer time element, it withstands temporary overloads, but it will open the line before any damage can be done to the equipment or to the insulation of the conductors.

The service breaker is operated by a quick-make and kuick-break toggle switch. This eliminates contact burning and variable action. It is operated from the front by an improved and perfectly insulated handle, which can be locked or sealed in the off position if desired. The box is of the usual form and dimensions, with arrangements made for ordinary meter trims and banking troughs.

WK-50 Meter Service Breaker

Since there is no need to have access to the circuit-breaker mechanism, it is sealed inside an insulating cover. This feature prevents tampering and helps in keeping out dust and dirt. External connections make it unnecessary to disturb the circuit breaker and facilitate wiring. All parts are cadmium plated to reduce corrosion, or are of non-corrosive material to prevent moving parts from corroding together.

The self-heating bi-metal, operating the latch on the breaker, will not fuse on any overload current that can be obtained at the rated voltage. In case of mechanical failure, this U-shaped bi-metal acts in the circuit as a link fuse and opens the circuit without injury to other parts of the breaker.

This meter service breaker eliminates the tampering with fuses and protects the user from the hazards encountered when replacing blown fuses. It is for 30-ampere, 125-volt, 2-wire, solid neutral service. The breaker has been accepted by the Underwriters' Laboratories.

RECENT TEXTILE PATENTS

BINDER for textile machinery. 1,727,783-4. H. Pulster, Philadelphia, Pa.

CARDING machines, Doffing roll for. 1,727,393. E. L. Cady, Hartford, Conn. Assigned to The E. L. Cady Engineering Co., Hartford, Conn.

COTTON chopper. 1,728,145. B. F. Watkins, Philadelphia, Pa.

COTTON cleaners, Variable-speed operating mechanism for. 1,727,734. J. A. Streun, Sherman, Texas.

COTTONSEED delinting machine. 1,727,572. D. Taylor, Paris, Texas.

FORM for inspecting stockings, Expansible. 1,727,499. E. R. Ammon, Reading, Pa.

HOSIERY inspecting device. 1,727,498. E. R. Ammon, Reading, Pa.

KNITTING machines, Yarn anchor for. 1,727,905. I. Rottenberg, New York, N. Y.

SHUTTLE. 1,728,083. C. H. Sergeson, Philadelphia, Pa.

SHUTTLE, Self-threading loom. 1,728,160. G. A. Litchfield, Southbridge, Mass. Assigned to Litchfield Shuttle Co., Southbridge, Mass.

SPINNING machines, Tension device for. 1,728,066. G. A. Lay, Draper, N. C.

STRETCHING textile and other fabrics or materials, Apparatus for. 1,728,067. A. Livesey, Manchester, England.

TEXTILE fibers, Producing a preparation for softening and oiling. 1,728,118. S. Fuchs, Hochst, Germany. Assigned to I. G. Farbenindustrie Aktiengesellschaft, Frankfort, Germany.

UNDERCLEARER for the rollers of yarn preparing, spinning, and like frames. 1,727,512. H. H. Mallott, Grimsargh, England. Assigned to Textile Under-Clearers, Ltd., Preston, England.

WINDER. 1,727,534 and 1,727,749. H. D. Colman and B. A. Peterson, Rockford, Ill. Assigned to E. S. Nethercut, Evanston, Ill.

WINDING machine. 1,727,884. C. C. Jessen, Passaic, N. J. Assigned to Napon Rayon Corp., Clifton, N. J.

Tuscaloosa, Ala. W. G. McCord has begun operation of a mattress factory for which he has expended several thousand dollars for modern machinery.

Have you room for a sideline?

Then the knitting business can't be so good

KNITTING is your business, or at least that part of your business that actually produces profit. Then why is that whole side of the room given over to winding machines: you don't sell bobbins, do you? How can you show a real profit on your knitting when you have to charge off against it all the overhead and running expenses of oiling and winding? If you can make as much money oiling and winding as you can knitting, why not go into it on a wholesale basis and make some real money? Or perhaps there's more money in knitting. Then why not turn that unproductive floor space and invested capital into productive manufacturing?

If you can oil and wind more scientifically and economically than the rayon producer, then perhaps there's a big market for home knitting machines, too. If you can save as much money oiling and winding skeins as your profits on knitting, tell us how you do it.

As a matter of fact, we think we know the most economical (and that doesn't mean just cheap) way of oiling and winding rayon cones. We were the pioneers among rayon manufacturers in oiling and winding cones. We make more cones than any other rayon producer. And the only reason we wind and oil so many cones is that so many knitting mills seem to think we do it better and more economically than they could. And they do seem to know their costs of operation.

Furthermore, there are a lot of advantages in du Pont cones that no knitter so far has been able to wind into his bottle bobbins. For instance, knots on the head where they can't tangle and cause a break. For instance, twice as much yarn as you can get on a bottle bobbin so your machines can run twice as long. For instance, all first quality yarn that hasn't been degraded by repeated handling; you get what you pay for. And, for instance, more uniform tension due to more constant ballooning.

Why tie up capital in additional yarn inventory when you can buy cones ready for immediate knitting? When oil, labor, maintenance of bobbins, machinery and general overhead make your costs of oiling and winding uncertain, isn't it better to buy du Pont cones at a definite price and know your costs and your profits?

This is an age of specialization. There's usually room enough for only one line in a really profitable business. Therefore, why not let du Pont do your winding and oiling, and stick to the much more profitable knitting business?

Du Pont Rayon Company, Inc.
2 Park Avenue, New York City.

DUPONT RAYON
REG. U.S. PAT. OFF.

Member Rayon Institute of America, Inc.

QUESTIONS AND ANSWERS

Service on Mill Problems and Correspondence with Readers

Sizing for Denim Warps

Technical Editor:

Will you please give us a good sizing formula for sizing denim warps? In the southern States they seem to get a heavier size on their warps than we do, and it gives the cloth a much firmer feel. Do you know what their sizing formula is? We would appreciate it if you would let us know. (6937)

Two formulas used by southern mills for denim warps are given herewith. While they may have to be modified to suit certain conditions and kinds of water, both will give excellent results. Formula No. 2 is used by mills that manufacture their own denims into overalls. No. 1 formula is used by a mill for coverts, denims, and automobile seat covers. This mill turns out a very high-grade product.

Formula No. 1

Eagle starch No. 2	160 lb.
Good tallow	12 lb.
Gum tragacanth	1 lb.
Glycerine	5 lb.
Water	160 gal.

Boil not less than one hour.

Formula No. 2

Eagle starch No. 2	300 lb.
Tallow	21 lb.
Gum tragacanth	1½ lb.
Water	320 gal.

Boil one hour

The manufacturers of sizing materials advertising in TEXTILE WORLD will be glad to give you other formulas and can work out anything you need.

* * *

Firm Finish on Cotton Fabric

Technical Editor:

We are enclosing herewith a sample of cloth which we wish to dye into various shades from the white. We want to do some little experimenting here in our factory, and we would appreciate your informing us just what percentage of sizing and what type of sizing we should use for the purpose of retaining the firm finish as in this sample. (6938)

The sample of cloth with firm finish contains a total of about 13% of finishing material, of which approximately one-half is mineral matter. As this fabric has been backfilled, it will be impossible to duplicate the finish on an ordinary starch mangle, the use of a backfilling machine (Tommy Dodd) being required.

If you are not familiar with backfilling, several trials will probably be necessary before the exact handle desired is produced. The following recipe should prove satisfactory for a starting formula, and after finishing a short run the quantities and proportions of the materials may be varied until the correct finish is obtained:

For a 100-gal. mix, take
- 50 lb. talc
- 20 lb. corn starch
- 15 lb. dextrine
- 15 lb. sulphonated tallow
- 20 lb. rosin size

This mixture must be thoroughly agitated while bringing to a boil. After a few minutes boiling it is ready to use. Turkey-red oil is often used in backfilling in place of sulphonated tallow, and calcium sulphate (mineral white) sometimes replaces part of the talc.

After backfilling, the goods are dried on revolving cylinders or dry cans arranged so that only the face of the goods comes in contact with the heated cylinders. Calendering is often necessary, in which case a five-bowl calender with three combination rolls and two chilled iron rolls is usually suitable.

* * *

Defective Warp Floats in Crepe Satin

Technical Editor:

We are sending a sample of crepe-back satin. In examining this piece you will note on the side which shows the dyer's mark a different weave. This is the only piece on the warp that has been called to our attention that shows this effect. We have followed up this warp through the other fourteen pieces, and everything was all right. Our contention is, therefore, that the dyer must have spoiled this piece. Will you be kind enough to advise us what could have caused such an effect on the goods? You will note that three-quarters of the width is okay, while the edge shows the imperfection. (6940)

The sample submitted is a crepe satin and shows a bad defect on both back and front, extending in about eight or ten inches, and gradually fading away. It is more pronounced near the selvage. A careful examination of this defect shows that it is not the dyer's fault, but is a mis-weave which is not caused by any mechanical failure of the loom, but is positively the fault of a low harness shaft. The cord on one shaft possibly slipped or stretched, or perhaps slid off the roller, and the shuttle in picking across the shed shot over many silk ends on this one shaft instead of under them. This can readily be determined by analysis because the spots which show this defect show a nine-pick float instead of a four-pick float in the warp.

* * *

Unshrinkable Process for Wool Jerseys

Technical Editor:

We are dyeing a large number of wool jerseys, a small sample of which we enclose. One of our customers is complaining that this cloth shrinks, and is asking us if there is a process of making this type of cloth practically unshrinkable. If you know of a process of this nature, would you be so good as to advise us what the formula is. (6942)

To make wool jerseys unshrinkable, the following process is used with considerable success: Load the cloth before dyeing into a clean dyeing machine and treat as follows: The cloth is saturated with a solution of muriatic acid of 1.5° to 2° Tw. strength, and is then worked in a cold solution of bleaching powder, containing not more than .6 gram of available chlorine per liter, for about 20 min. After washing well with cold water, the chlorinated cloth is soaked in a cold solution of hyposulphite of soda of about 1% strength. Run in this until no chlorine is present in the cloth, as shown by a starch-iodide test. This cloth is further washed with cold water, and finally treated in a weak soda-ash bath for 5 min.; then again washed with cold water for 10 min.

* * *

Finish for Cotton Twine

Technical Editor:

I am enclosing herewith small sample of glazed, polished cotton twine. We manufacture the raw twine and desire to duplicate this finish. Can you give me the formula for this process? (6936)

While the sample has been dyed in

In this department, we undertake to answer, free of charge, to the best of our ability, questions pertaining to textile matters received from any regular subscriber to TEXTILE WORLD.

Inquiries should give the fullest information and data possible. In the case of damage to material, a sample should be sent. In this way answers can be given which will be of immediate technical value to the correspondent and to others in the same line. Inquiries pertaining to textile processes, machinery improvements, methods of management, the markets, etc., are especially invited as well as any legitimate discussion on the views expressed.

All inquiries must be accompanied by the name of the person inquiring, not for publication, but as an evidence of good faith. The identity of those seeking information on technical subjects will not be disclosed.

If the question is not of general interest to textile readers and involves expensive investigation, a charge covering the cost may be made, of which the inquirer will be advised before any expense is incurred.

Letters expressing opinions or voicing criticism will be signed by the correspondent's name unless the letter itself contains a request that the name be withheld.

For prompt service, technical inquiries should be sent directly to the Technical Editor, TEXTILE WORLD, 1427 Statler Bldg., Boston, Mass.

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the regular manner, a large amount of this class of goods is dyed while it is being glazed. Tufting and roll edge twines are examples. In fact, almost all manufacturers of this class of goods are using this method of dyeing. The following formula will duplicate the finish of the sample: 20 lb. corn starch; 5 lb. tapioca flour; 2½ lb. beeswax; 3 lb. carnauba wax. The carnauba wax must be saponified before adding to the rest of the mixture. This formula will make 50 gal. of starch.

* * *

Cut Yarn in Rayon Fabric

Technical Editor:

Enclosed find sample piece of crepe, wherein you will notice defects. We would appreciate your advising us whether these defects are caused by the yarn used or by faulty weaving. If the trouble is in the weaving, how can it be overcome? We have been advised that these defects are not detected in the piece before it is dyed. (6927)

The sample submitted is an all-rayon fabric. The warp has been reeded 50/2, equaling 100 ends per inch, of a rayon that is approximately 150 denier. It has been woven with 52 picks of a crepe-twist rayon yarn, apparently about 100-denier size, pick and pick; one pick right-hand twist and one pick left-hand twist. The weave is plain and the fabric is piece dyed in an ecru shade.

The damages appear as short, shiny, horizontal marks, there being twelve of them in the sample, which is about 10 in. square. The length of these blemishes are from ⅛ to ¾ in. Examination shows that, at each place, one or more of the filling threads have been cut, and, being crepe twisted, have drawn apart sidewise. This has left the shiny and but slightly twisted warp free to "float" over three or five picks, as the case might be, thus producing the aspect described. This cutting probably has been caused by the sand roller of the loom. The sandpaper covering the roller may have been too sharp; or an excessive warp tension, in connection with a sand roller not unreasonably sharp, may similarly have caused it.

As the action of the sharp particles of sand gives a chisel-like cutting, and not a fraying effect, such defects would not be observable in the cloth as taken from the loom, unless very carefully and minutely searched for under a good magnifying glass. Both warp and filling threads may thus be more or less cut. The cut fibers in the warp threads do not protrude, and the warp ends, being coarser in size and not having been hard twisted, do not break apart. The filling threads where the cutting action has been substantial, though without a complete severing of the threads, will break apart when exposed to the severe stretch of the tentering frame, and it is thus that the damages that we are considering become apparent.

Even in the small size sample submitted, practically every one of the filling threads, when drawn out of the cloth and critically observed, shows more or less slight fraying or cutting of the fibers. Similarly the warp ends, when drawn out and examined show cut fibers, many of them being cut in a single place. At least two-thirds of them are affected, although the cutting action of the sand roll is not so severe on the warp as on the filling.

The inquirer, therefore, should see to it that none of the friction rolls in his looms are covered with unduly sharp sandpaper. Where the warp tension is unduly heavy he should reduce it. Cutting in this way also can be eliminated by having the friction rolls covered with suitable corrugated or pyramid-point rubber, or rubber with any other form of face that will get a firm grip on the cloth. JAMES CHITTICK.

* * *

Stained Knots in Rayon

Technical Editor:

I enclose three small cuttings of rayon showing the dirty knots of the winders. Could you suggest to us something that would eliminate this dirt in our scour bath? These samples were scoured at the boil for one hour with 10% olive-oil soap and 2% alkali. We are unable to remove the dirt in a two-bath scour. Could the winders overcome this difficulty? (6934)

The best way to eliminate the dirty knots complained of is to cut the amount of breakage on the winders to a minimum. By conditioning properly this trouble can be reduced. These black grease stains are being successfully eliminated in the scour by the use of Chlorsol, using about 5%. We would recommend the following recipe: 5% olive oil soap; 5% Chlorsol; 2% alkali.

* * *

Sizing Ribbon

Technical Editor:

In one of our manufacturing processes we are running a warp of 66 ends, 10-thread China Tsatlee, 20/22 denier, through a sizing solution. The width of the warp ends gives a ribbon about one inch across. This is run through a sizing solution consisting of one part high jelly strength gelatine of 220 grams, and four parts water at a temperature of 140°. Our present method is to run through rollers in the solution and then bring it out over wipers and squeeze rollers. This is very unsatisfactory as it is hard to get the right amount of solution on the ribbon, and also because the solution is not placed uniformly on each tram thread.

We note in reading of slashing operations that mention is made of "quetsch" rollers, and we are wondering whether it would be possible for us to use this method. Do you think that the quetsch roller would work in connection with the gelatine solution that we mentioned above? Have you any articles or books on construction of quetsch rollers? We assume the large roller would have to be made of brass and we would be interested to know what diameter would be necessary and also the width necessary to take care of an inch ribbon; what kind of cloth is used on the roller and how it is put on; also what is the diameter and length of the small top roller which we understand is made of brass and covered with rubber; what are the specifications for the rubber covering and what firms would cover these rollers for us?

In our process our coating does not run continuously as the various lengths are drawn out by hand, which means that a portion of the time the quetsch roller would not be moving and possibly would have the opportunity of drying for 30 sec. Would this interfere with the cloth roller? (6933)

It is not clear whether the warp is to be sized or whether the woven ribbon is to be finished. The action of sizing the warp would be to run the ends through the solution and dry over drums. A take-up and let-off would be required to hold the beams or rolls while the sizing was in operation. The method of finishing a ribbon would be to run between quetsch rolls, over drying drums, and if satin faced, calendered between paper rolls.

The quetsch rolls consist of three rollers, and may be one of brass and two of rubber, set one on top of the other. These rolls vary in length according to the width of the machine. The brass roll measures from 6 to 7 in. in diameter and runs in the sizing solution. The mixing solution is held in a circular pan at the bottom. The two rubber rolls operate above the brass roll and pick up the solution from the brass roll, so that only a coating of the solution is smeared on the ribbon. These rubber rolls may be 4 in. in diameter. The ribbon runs between the two rubber rolls.

From the quetsch rolls the ribbon runs over drying drums to dry the solution on the ribbon. From two to eight drum machines are used. We think a two- or three-drum machine would be sufficient. The first drum is usually covered with muslin by sweating the muslin on to the drum. This muslin acts as a shimmy to reduce the heat so as not to bake the solution on the ribbon.

The calender is a gas-heated ironer for high-lustered surfaces. This consists of two hollow steel rolls which are heated by gas through a pipe in the hollow of the rolls. Between the steel rolls are one or two pressed paper rolls through which the ribbon is run.

A take-up and let-off is required for feeding the machine and for taking up the ribbon after finishing. These consist of upright stands with any number of horizontal square revolving bars. These bars are about one inch square to take a round wooden block with a square hole to hold the ribbon. The take-up is driven by circular belts from the machine and the let-off is usually equipped with a friction disk to furnish the necessary drag.

MILL NEWS

COTTON

Choccolocco Mills, Anniston, Ala., have been organized to take the place of the old **Woodstock Cotton Mills,** and a new dye plant has been added to the mills. D. D. Campbell is to be president of the new concern and C. B. Gunn will remain as superintendent. The mill manufactures tapestries, draperies and bedspreads.

Tuscaloosa Mills, Cottondale, Ala., have begun operations after being closed down for several weeks. Forty employes are at work.

Globe Cotton Mills, Augusta, Ga., have installed additional 40-inch Stafford looms for the production of osnaburgs and ducks, according to recent reports.

Star Thread Mills, at Barnett Shoals, near Athens, Ga., have shut down for an indefinite period.

Dean & Sherk Corp., Lawrenceburg, Ky., manufacturers of cotton thread, will probably have to close down for a while as a result of a threatened water famine.

Osborn Mills, Fall River, Mass., were purchased Sept. 13, by Fred G. McAdams of the bondholders committee for $71,000. The auction sale included two mill buildings, office building, cotton sheds, real estate, equipment and supplies.

Walcott-Campbell Spinning Co., Gulfport, Miss., has awarded a contract to the Gates Electric Co., Gulfport, for electric wiring for light and power service, including motor connections, in new local mill unit, now under way, to cost in excess of $100,000, with equipment. Robert & Co., Bona Allen Building, Atlanta, Ga., are architects and engineers. About 2,500 tons of machinery from the New York Mills, at Utica, N. Y., which have been closed down for the last three years, is being shipped to the new Gulfport plant via the Barge Canal and the Hudson River and then straight to Gulfport on one of the Munson liners. The new plant is expected to be ready by Jan. 1. It is one of the most modern and complete plants in the South. It is stated that machinery from Pawtucket, R. I., and Taunton, Mass., will also be shipped to the Gulfport plant.

Northampton Textile Co., Mount Holly, N. J., is pushing work on a one-story addition, totaling about 4,000 sq.ft., and proposes to have the unit ready for the installation of equipment early next month.

E. M. Holt Plaid Mills, Inc., Burlington, N. C. A three story addition, 56x75 ft., will be built at an early date, it was announced by Lynn B. Williamson, of Greensboro, president of the mills, costing $50,000. The new building, which is being designed by James M. Workman, structural engineer of Greensboro, will embody the latest features in mill construction and the exterior will be of brick with trimmings to harmonize with the rest of the plant buildings. The addition to the E. M. Holt Plaid Mills, Inc., which manufactures rayon dress goods and novelties, was found necessary on account of the growing demand for its products.

Ruby Cotton Mills, Inc., Gastonia, N. C., are having two additional combers installed.

Cascade Mills, Inc., Mooresville, N. C. A small sub-station is being built at the mills by the Southern Public Utilities Co.

Rosemary Mfg. Co., Roanoke Rapids, N. C., has awarded the following subcontracts for the addition to its plant: Brick, Grant Brick Works, Weldon, N. C.; grading, Wylie Bros., Spartanburg, S. C.; cement, Halifax (N. C.) Builders Supply Co.; lumber, R. L. McLeod & Son, Laurinburg, N. C.; roofing and sheet metal, J. A. Piper Roofing Co., Greenville, S. C.; steel sash and door operating devices, David Lupton's Sons Const. Co., Atlanta, Ga. The addition, of which J. E. Sirrine & Co., of Greenville, are the engineers, will be two stories, of brick and steel construction, and will be used for spinning and weaving. Contracts were previously awarded to the Belmont Iron Works, Philadelphia, for steel, and to the American Cast Iron Co. for cast iron columns.

Patterson Mills Co., Roanoke Rapids, N. C., have been sold to the Simmons Co., according to reliable information. This plant has 29,000 spindles and 1,000 looms. It was capitalized at $670,000. The Simmons interests now control all the mills at Roanoke Rapids, the others being the Rosemary Mfg. Co. and the Roanoke Mills Co., giving them a total spindleage of 134,000, with 4,122 looms.

Taylorsville, N. C. Application for bankruptcy proceedings has been requested for the **Miller Mfg. Co.,** and the **Taylorsville Cotton Mill Co.,** it is reported. These concerns were manufacturers of double carded yarns but have been closed for several months.

Republic Cotton Mills, Great Falls, S. C. The addition to plant No. 3 which is being constructed by Fiske-Carter Construction Co., Greenville, S. C., is rapidly nearing completion. Some spinning equipment has already been installed in the basement of the present mill, and it is expected to have all machinery in the new building installed and in full operation by Nov. 1. It is reported that the 40 dwelling houses which are being erected by Citizens Mfg. Co., Ruth, N. C., should all be completed within 30 days. J. E. Sirrine & Co., of Greenville, are the architects and engineers in charge.

Victor - Monaghan Co., Greenville, S. C., has placed a contract with Cox and Hodgens, of that city, for the erection of a modern gymnasium at the Victor plant, Greer, S. C., according to announcements from J. E. Sirrine & Co., engineers, of Greenville.

Lund Co., Inc., Rock Hill, S. C., are installing additional looms and when the final shipment arrives there will be 58 looms in operation. When these are installed the number of employes will be doubled.

WOOL

M. J. Whittall Associates, Worcester, Mass., will build a new power house of brick and steel construction 80x110 ft., which will house four boilers. Contract for the construction has been placed with the Morton C. Tuttle Co., who are also constructing the new Oriental Mill for the Whittall company at the South Worcester plant.

Stephen Sanford & Sons, Inc., Amsterdam, N. Y., are increasing working schedules by taking on new hands for both day and night shifts.

Ashworth-Odell Worsted Mills, Salamanca, N. Y., will not reopen Oct. 1, according to an announcement by F. B. Vreeland, chairman of the board of the reorganized concern. A contract had been made with William Koehler, Holyoke, Mass., for the management of the plant, but Mr. Koehler has decided to remain with the Germania Worsted Co. The board, however, is negotiating with other parties and hopes to secure a competent manager at an early date.

Victoria Mills, Thornton, R. I., have started a night shift of workers. Additional help will be secured for the night shift including winders and experienced operatives for other departments.

KNIT

Triumph Hosiery Mills, New York, has let contract to D. A. Smith for erection of an addition at the York, Pa., plant which will have a total floor space of 30,000 sq.ft., devoted exclusively to the manufacture of women's fine gauge full-fashioned hosiery. Additional full-fashioned hosiery machines have been ordered. The new equipment will be Karl Lieberknecht fine gauge machines. For the last year, the York mill has been running on a day and night shift and with the new equipment ordered, production will be almost doubled.

***Nebel Knitting Co.,** Charlotte, N. C., has awarded contract to the Southeastern Construction Co. for building a two-story addition to the plant costing approximately $375,000.

McPar Hosiery Mills, of Marion, N. C., have purchased two 12-section Paramount drying forms and an American Laundry Machinery Co. extractor. These will be installed in the new addition to this plant.

Mt. Airy (N. C.) Knitting Co. is now in full operation and according to James H. Crossingham, vice-president and manager, the company expects to produce about 50% more than last year. Recently Bruce Springthorpe & Sons, manufacturers of bathing suits, coats and sweaters, of Philadelphia, moved their equipment from that city to Mt. Airy, under the direction of the Mt. Airy Knitting Co.

Jantzen Knitting Mills, Portland, Ore., have awarded a general contract to

Robertson, Hay & Wallace, Weatherly Bldg., Portland, for a two-story and basement addition, 100x180 ft., reinforced-concrete, at $55,800; contract for painting has been let to Williamson & Bleid, 93 Eleventh St. Entire project is reported to cost about $110,000, with equipment. Richard Sundleaf, Guaranty Bldg., is architect.

Philadelphia, Pa. Gustav Ruehling, has filed plans for a one-story hosiery mill at Tulip and Foust Sts., to cost about $25,000, for which general contract recently was let to J. D. Fotheringham, 1000 Arrott St.

Fidelity Knitting Mills, Philadelphia, Pa. This concern, manufacturing full-fashioned hosiery, is now operating a double shift and expects to continue on that basis for some time.

Roomey-Toe Hosiery Mills, Inc., Spartanburg, S. C., with capital stock of $10,000, has been chartered with Carl Loven, president and secretary; and C. C. Dargan, vice-president and treasurer.

***Everwear Hosiery Co.,** Chattanooga, Tenn., which was moved from Milwaukee, Wis., two months ago, will soon begin the construction of a dye house and finishing plant, according to an announcement from C. H. Bond, vice-president and general manager of the concern. Machinery for the new dye house has been purchased but the exact location of the proposed building has not been decided upon. Rapid growth of business makes the new plant a necessary addition, it was said, although the expenditure involved was not made public.

Davenport Hosiery Mills, Inc., Chattanooga, Tenn., have announced plans for an addition to their full-fashioned plant which will entail an expenditure of approximately $300,000 for building and machinery. It was stated by Joseph H. Davenport, secretary and treasurer, following a meeting of the board of directors Sept. 12, that orders had already been placed for full-fashioned hosiery machinery which will increase production about 300 dozen pairs daily, making the total productive capacity of the plant 1,500 dozen pairs per day. The addition to the present building will increase the height from two stories to three stories. The original foundation was designed to bear the weight of five stories thereby providing for further expansion. Present plans call for a washed air humidifier system which will remove dust, soot and smoke from the air and maintain uniform temperature and humidity.

Kingsport (Tenn.) Hosiery Mills, have closed down a portion of their mill, releasing a number of employes, and will concentrate production in the full-fashioned mill division, recently constructed, until further notice.

Toronto (Ont.) Hosiery Co. plant was partially wrecked by an explosion of a boiler in the basement when the watchman was examining the boiler. Burning oil splattered over him and set fire to merchandise in the building. The fire was extinguished by the sprinkler system with which the building is equipped. The watchman was severely burned but is expected to live.

*Indicates previous mention of project.

SILK

Brewton, Ala. More than 125 large machines, 80 of which are looms, have just arrived at Brewton for the new silk mill, and the task of putting all of these in proper position and making the necessary electrical connections, is now under way.

Aronsohn-Blum Silk Co., Bayonne, N. J. The mill of this company at Ave. A and Twenty-third St., damaged by fire about a year ago, is said to have been acquired by another company, name temporarily withheld, which will rebuild the structure and resume operations at an early date.

Barone Silk Co., Fredonia, Chautauqua County, N. Y., has filed a voluntary petition in bankruptcy in Buffalo District Court. Liabilities are scheduled at $5,430 and assets are $4,861. The company operates a local silk manufacturing plant.

Southern Silk Mills, Inc., of Greensboro, N. C., have awarded contract for erection of a $150,000 branch silk mill at Kernersville, N. C., to J. L. Crouse, of Greensboro, the contract calling for completion in 90 days. The plant, which will be located on a ten acre tract recently purchased, will have 100 looms for the manufacture of broad silks and crepe de chines and will give employment to one hundred persons.

RAYON

Skenandoa Rayon Corp., Utica, N. Y., has awarded contract to the Aberthaw Co., 80 Federal St., Boston, Mass., for a new boiler house from plans by W. E. S. Dyer, Philadelphia.

American Glanzstoff Corp., Elizabethton, Tenn., has work under way on new addition to mill for which contract for structural steel framing was recently let to the McClintic-Marshall Co., Oliver Building, Pittsburgh, Pa. It will cost about $1,500,000 with equipment, and is scheduled for completion early next year.

Du Pont Rayon Co., Waynesboro, Va., have had painted the name of the town in large letters on the roof of the spinning building of the acetate rayon plant as a guide to airplanes.

Viscose Co., Parkersburg, W. Va. will start work soon on an additional unit to their local plant, it is expected, which will probably double the capacity of the plant, now employing 2,700 persons, but with the completion of the new unit it will have a payroll of 5,000 persons. The present plant turns out, it is understood, 210,000 lb. of rayon yarn per week, which through expansion, will be increased to 450,000 lb. weekly.

DYE, BLEACH AND FINISH

Fall River (Mass.) Dye Works, Inc., recently formed with capital of 350 shares of stock, no par value, to operate a local mill, will be represented by George Abrash, 130 Madison Ave., New York, treasurer. Samuel Abrash is president.

***Wilson Finishing Mills, Inc.,** Burlington, N. C., have begun operations at the Mayfair Mills, Inc., in the northwestern section of the city. The company occupies some 30,000 sq.ft. of floor space with its dyeing and finishing equipment, and its present capacity is 25,000 dozen pairs of host a week. The new plant has contracts that made it necessary to begin operations immediately, and it has 100 operatives at the opening. The company has authorized capital stock of $100,000, of which $40,000 is paid in. The officers are W. W. Sellars, president; R. H. Whitehead, vice-president and R. D. Wilson, secretary-treasurer.

Slatersville (R. I.) Finishing Co.'s new boiler plant is being enclosed and contract for the plumbing work was awarded to the Woonsocket (R. I.) Supply Co. Temple & Crane Inc., Boston, Mass., are general contractors.

***Woonsocket (R. I.) Dyeing & Bleaching Co.,** has started excavation and it is expected that the foundation for the new addition to the plant will start within ten days and will be followed immediately by work on superstructure of the building.

Clearwater (S. C.) Mfg. Co., has been chartered with capital stock of $1,000,000. Officers of the concern are: Homer Loring, president; F. W. Thomas, vice-president; M. L. McLane, secretary and treasurer; J. F. Sofgee, assistant secretary and treasurer.

Rock Hill (S. C.) Printing & Finishing Co., is making notable progress on construction of the main and other buildings of the plant. The large main building will be ready to turn over to the company within the next few days.

MISCELLANEOUS

Bullardville Mills, Winchendon, Mass. The first meeting of the creditors of Austin S. Graton, doing business under this style, was held before the referee in bankruptcy in Worcester, Mass., on Sept. 19.

Albany Fibre Co., Inc., Rensselaer, N. Y., has purchased a large tract of land near its plant on Forbes Road on which a four-story brick fireproof addition will be built early next year. The structure will be used for warehouse purposes and will allow for increased production of shoddy in the main plant, according to Carl Lavine, president.

Burton-Dixie Corp., Chicago, Ill., has secured a 4-acre tract of land on Thomas St., Memphis, Tenn., as site for a new mattress manufacturing plant, to be of multi-story type, reported to cost more than $200,000, with equipment.

Standard Costs

versus

Actual Costs

Actual Costs are units derived from the distribution of charges for a given period to the product of that period. For historical records they answer the purpose, but for a guide to sales policies and inventory values they are woefully lacking.

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TEXTILE WORLD ANALYST

Commodity Production Too Great for Strength

Textile Activity Likely to Recede a Little, Forecasts Dr. L. H. Haney

THE most favorable factors affecting general business at present are the good volume of retail trade and the fairly heavy movement of freight traffic. Taken together, the two indicate a satisfactory volume of distribution. To these we can add the absence of general inflation in commodity prices and the apparently strong condition of the Federal Reserve Banks. However much over-loaned the member banks may be, the high Federal Reserve ratio is reassuring and the total volume of reserve credit, as lately reported, is not excessive.

SUMMARY—GENERAL

1. Business continues active. Production in general is too great to allow strong commodity markets, and industrial activity will round off gradually; but railway freight traffic and retail trade continue large, and improved in August.

2. Textile activity, which in recent years has moved in two-year cycles, seems likely to recede somewhat.

3. Mill stocks have reached new lows, but are near bottom and improved margins of profit for manufacturers of wool and cotton textiles are a favorable factor.

Unfavorable Indications Grow

It seems probable, however, that the unfavorable factors have continued to gain in weight. Following resumption of the downward trend in building activity during August, and a further decline in automobile production, we learn that there was an unusually sharp drop in unfilled orders of the Steel Corporation. This occurred despite a more than seasonal decline in steel ingot production in the same month.

The government's index of industrial production declined in July, and total manufacturing production showed the first decline since last November. Coming after so long an increase and at such an abnormally high level, the decline seems significant. Factory employment entered a declining trend last month.

August exports decreased, which is unusual in that month, and adjusted figures indicate a level which, allowing for seasonal variation, is the lowest but one reached in any month since early 1928.

We must also remember that long continued drouth has reduced the chief farm crops below average and that rarely do high prices compensate for short crops.

Finally, it is becoming increasingly evident that financial inflation and the pyramiding of speculation are nearing the limit.

It does not seem probable that the decline in general business will be sharp, at least for several months. It will not be generally recognized until railway freight traffic begins to decline, and such a decline is not yet in sight. Accordingly, business sentiment is not likely to be much disturbed for another month or two. We can say only that careful statistical appraisals indicate that the peak of the business cycle has already been passed.

Production Restrains Prices

The first considerable decline in general manufacturing since October - November, 1929 appeared in July. Coming as expected and at a point so far above normal this decline will be watched with interest. We know that steel production was off in August and there is some reason for anticipating a further decline in general manufacturing curve.

As to the general price level, slight gains occurred in July and August according to the Bradstreet index, but these are not confirmed by some other indexes, and weekly data have shown declines in late August and early September. It will be noted that commodity prices have made some recovery

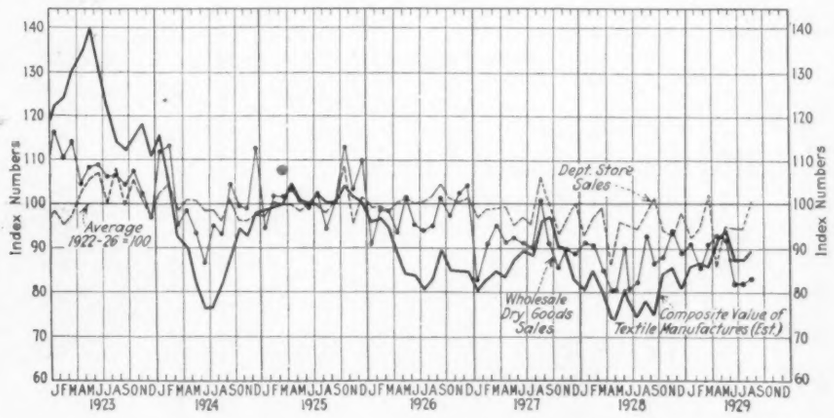

Fig. 1. GENERAL TEXTILE BAROMETER—Wholesale Dry Goods Sales—Adjusted for seasonal variation; 1922-1926 Average=100; (Federal Reserve Board) Dep't Store Sales—Adjusted for seasonal variation and trend; (Federal Reserve Board) Composite Value of Textile Manufactures (Estimated)—Weighted Composite of Cotton, Wool and Silk Machinery Activity adjusted for Seasonal Variation and price levels (N. Y. University, Bureau of Business Research).

The analysis and forecast of Dr. Lewis H. Haney, Director, New York University, Business Research Bureau, which regularly appears on this page, considers various branches of the textile industry from week to week.

The conclusions reached in the Analyst are mostly forecasts and generally apply to a time two or three months ahead. The Analyst is based on statistical data and does not reflect temporary trade sentiment.

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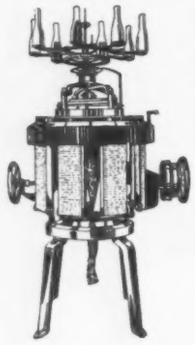

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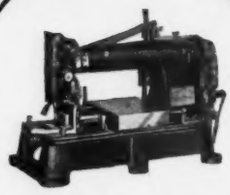

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about August in each of the last nine years, and it is rather probable that the slight upturn in the Bradstreet index has a seasonal aspect.

We do not expect a sustained advance in the price level so long as production is so abnormally high. Temporary recovery may well attend the first months of curtailment in production, before the general nature of business recession is recognized. Such was the case in the autumn of 1923. But the price level is likely to run off again toward the end of the year.

Textile Two-Year Cycles

Most recent textile data available are only for July. The general situation in that month is as follows. Total textile production, based on machinery activity, recovered a little from the June decline and was about 7% above average. It was much above a normal relationship with wholesle dry goods sales and department store sales. The estimated total *value* of textiles produced also recovered slightly, but was far lower relatively than the quantity produced, and the July rise was smaller. It is considerably above an average relation with wholesale dry goods sales.

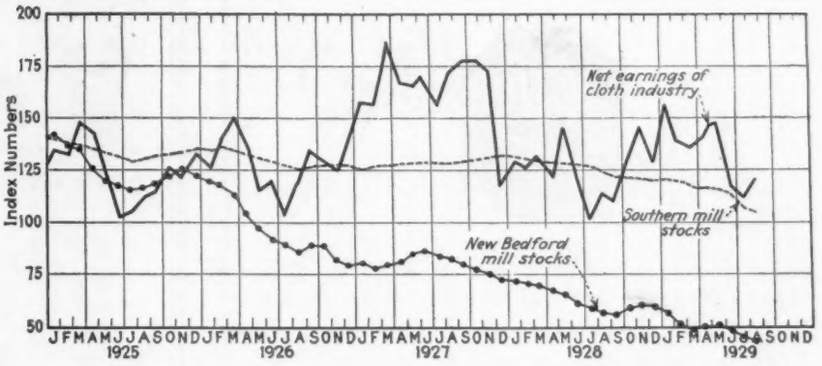
Wholesale dry goods sales appear to be in an irregularly downward trend, while department store sales gained sharply in August, as they have done in the same month of each of the three preceding years.

We note that the textile industry appears to be moving in two-year cycles. Bottoms were reached in 1922, 1924, 1926 and 1928. Tops came in 1923, 1925, 1927, and 1929. Will a bottom be reached in 1930? This seems rather probable, though the only certainty lies in the precedent. We can, however, say that average daily mill consumption of cotton declined in August, and that textile manufacturers (excepting silk) have been more prompt to curtail than in previous years; also that prices are lower and have less distance to fall.

Textile Mill Stocks at Lows

As anticipated last month, there has been no improvement in textile stocks as a group. The increasingly irregular speculative markets at present are not favorable to arousing public interest in mill securities. It may be, however, that the not uncommon tendency at the end of bull markets, when the old leaders have been pushed up as far as possible, to divert attention to the cheaper and more backward issues, will help textile securities.

Wool manufacturers' common stocks averaged lower in August, though not quite so low as a year ago. Our estimate of the average earnings of such manufacturers declined in July, but was considerably above a year ago and was the best for the season since 1923. The margins of the manufacturers, both replacement and actually earned, show improvement. Considering the well liquidated condition of the wool stocks, they should certainly hold well and show moderate gains except during periods of heavy general liquidation in the stock market.


Index Numbers
200
175
150
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100
75
50
Net earnings of cloth industry
Southern mill stocks
New Bedford mill stocks
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1925
1926
1927
1928
1929

Fig. 2. COTTON MILL EARNINGS AND SECURITY PRICES—Net Earnings in Cotton Cloth Industry—Computed from the cost of raw material, labor, fuel, etc., the price of finished goods and the volume of production (New York University, Bureau of Business Research). New Bedford Mill Stocks—Average price 25 New Bedford cotton mill stocks (New Bedford Standard). Southern Mill Stocks—Average price 25 Southern cotton mill stocks (R. S. Dickson & Co).

Cotton mill securities have fallen to the lowest levels since 1921, or early 1922. No definite forecast of improvement seems possible, but there are some signs that the worm may turn before long. The replacement margins of cloth manufacturers continue to gain and margins actually earned show improvement. This is only a trend, however, for they are not yet high enough to allow fair profits to the average cotton manufacturer.

Cotton Yarn Mill Notes

Tabulated Instructions for Doffing a Picker

By Gilbert R. Merrill

This is the sixth of a series of short articles on the correct operation of cotton-yarn machinery. The articles are written as brief instructions, tabulated in logical order and expressed in straight-to-the-point language. Previous articles of the series appeared July 6, p. 111; July 13, p. 73; July 20, p. 63; Aug. 10, p. 38; and Aug. 31, p. 55.—*Editor.*

1. See that a lap rod is placed in the hole of the lap arbor before the lap is ready to doff.

2. Release the starting handle, if the picker does not have a lap-measuring knock-off.

3. Release the friction with the left foot and see that the lap racks run up high enough to remove the lap arbor. (Sometimes the lap racks will run freely enough so that the pressure on the lap will carry them high enough. If they do not run high enough, turn the hand wheel to bring them to the proper level.) Do not run the racks too high as it may cause them to be out of level when lowered.

4. Step to the right side of the picker and withdraw the arbor as quickly as possible, allowing the lap to turn as it naturally would. (If the arbor sticks to the lap, it is well to polish it. Bolted whiting or powdered black lead may be used very satisfactorily for this purpose.)

5. Place the arbor on the hooks just front of the calender rolls.

6. Remove the lap to the lap scale or to a lap cart.

7. Start the picker by lifting the starting handle, by hand or by foot.

8. As soon as the lap is out enough, put the arbor under the lap racks and guide the end of the lap around it. (Watch your fingers.)

9. Lower the lap racks as quickly as possible on to the lap arbor. Do this so that the friction is effective when the racks are at the lowest point and compressing the lap.

10. Weigh the lap doffed and record the weight on the sheet provided for it. (If a full finisher lap is more than one-half pound over or under the standard weight, reject it and send it back to the finisher apron.)

Course on Cottons at Columbia

Columbia University of New York City, Extension Teaching, announces a comprehensive evening course in the manufacture and finishing of cotton goods, under the supervision of H. R. Mauersberger, of Cox, Fuller & Mauersberger, textile specialists, New York.

The lectures will be held every Friday evening, beginning Friday, Sept. 27, 1929, at 7:30 p.m. The entire course covers 30 lectures, 15 of which are given in the winter session, and comprise all operations from the raw cotton to the weaving of cloth. The remaining 15 lectures are given in the spring session, beginning Feb. 7, 1930, and cover the dyeing and finishing, as well as analysis of cotton fabrics.

The classes are held in Room 302, Mines Building, on the University Campus. A number of special features, such as moving pictures, trips to nearby plants, and illustration of the lectures by actual samples, are again introduced. The lectures are sufficiently technical to be absolutely accurate, yet any lay person can follow them. The courses are open to men and women alike, whether or not connected with the industry.

Registration of students started Sept. 18, 1929, at the office of the Registrar, Room 315, University Hall.

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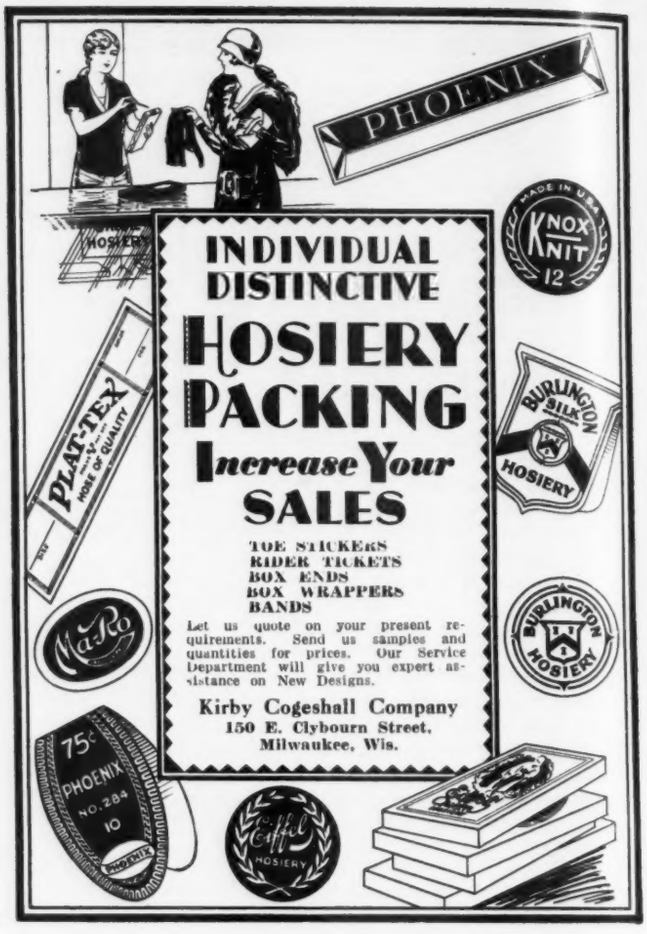

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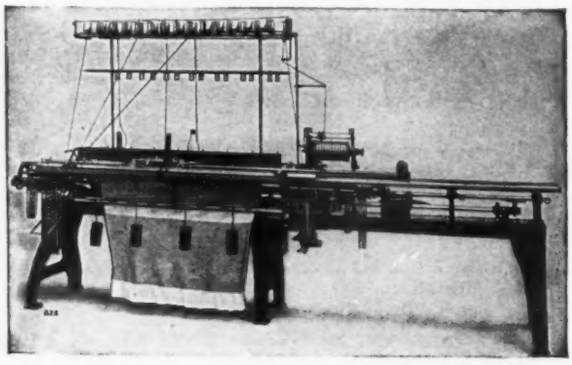

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KNIT GOODS

Underwear Market Active in Spots

Report Reordering on Heavyweights and Some Interest in Spring Lines

The knit underwear market is spotty; demand for spring light-weights has improved slightly, but current jobber interest continues to center on heavyweights. According to spokesmen for several outstanding producers of winterweights, the situation is very satisfactory. A few mills are on an 18-hour schedule, and production is about on a level with demand. Spot shipment is asked, in most cases.

Jobbers are somewhat more confident regarding heavyweights than they were last week. The warm spell in early September made them cautious, but the drop in temperature in the middle of the month, stimulated interest, and a good quantity of repeat orders has been placed. Heavyweight prices are firm and there is little disposition to undersell. Some knitters said they thought the market was almost strong enough to justify an increase in prices, but that feeling is far from general. An increase, if any, would not come before the new season, it is believed.

Men's rayon underwear is more active than usual for this time of the year. Both one-piece and two-piece suits are in demand, for spot shipment. There is some discussion as to the possibilities of men's rayon garments becoming a big-scale winter proposition. Hitherto, the winter demand has been confined mostly to the Pacific Coast and Southern States. The unusually good sales this month have encouraged knitters to hope that the cold States may also prove good winter market for rayon. However, the real possibility for the winter market seems to be the new rayon-and-wool underwear, which is believed to have very significant prospects. The producers of this line report a good demand, but it is still too early to gauge the possibilities of rayon-and-wool underwear with any degree of accuracy.

July Underwear Output Declines

Slightly Less Than June, Figures Show — Drop Mostly in Men's Lines

Knit underwear production during July was slightly behind that of June, according to statistics just compiled by the Department of Commerce. Figures gathered in a survey of 137 identical establishments showed that 1,073,919 doz. were shipped in July, compared with 1,125,564 doz. in June. The bulk of the decline seemed to fall in the men's numbers. Men's underwear output shaded off, in all lines, except summer drawers, which rose from 46,072 doz. in June to 47,342 doz. in July. There was a perceptible increase in the production of certain women's garments, especially winterweights, though the total production of drawers showed a decline of about 500 doz.

In another survey of 87 identical establishments July production again fell behind that of June. The total unfilled orders, first of month and new orders during month, was 2,443,890 for July against 2,632,386 for June. The situation as regards men's garments was similar to the first survey, except that the end-of-month stock for July exceeded that of June by a far greater margin.

The Department of Commerce also reported that July, 1929 underwear business was ahead of July, 1928. July, 1929, shipments totalled 1,071,766, against 949,135 in the previous year. Total of unfilled orders first of month and new orders during month also showed an increase this year.

Growing Call for Balbriggans

Advance requisitions for the Spring show a growing demand for fine balbriggans, and this type of knitted undergarment bids fair to become a notable feature in the trade, according to a statement issued by the Associated Knit Underwear Manufacturers of America.

The recent increasing preference by women for balbriggan underwear has encouraged producers to believe that next year's demand will be much heavier than for some time past. Many mills are reporting satisfactory advance orders in women's lines.

To meet the style and color consciousness of the consuming public, which has become so highly developed during the past two seasons—largely through the consistent efforts of the Knit Underwear Industry—balbriggan manufacturers announce that their product will appear in color tones and harmonizing trim that will be very attractive.

Hosiery Demand Improves

F. F., Children's and Some Half-Hose Lines Moving

HOSIERY demand showed a decided improvement during the past ten days, but the increase was limited to full-fashioned, children's and certain of the half-hose divisions. Knitters of medium-priced and high-priced full-fashioned hosiery reported a very active market, with prices steady and with the mills—in many, though not all instances—working day and night. One leading company located in the South said the full-fashioned situation was "excellent"; this firm has not cut prices, and a spokesman said they found no price weakness in their market. Buying was spread pretty evenly among all the full-fashioned numbers. Suntan was the favorite shade, though the staples such as gunmetal and black were becoming more important. Spot to four weeks was the rule, and the company referred to had no difficulty in meeting these requirements. Other knitters of medium-priced full-fashioned goods reported a fair demand. Both retailers and jobbers appear to be low on fall stocks in these lines, and are buying steadily.

Men's Fancies Improved

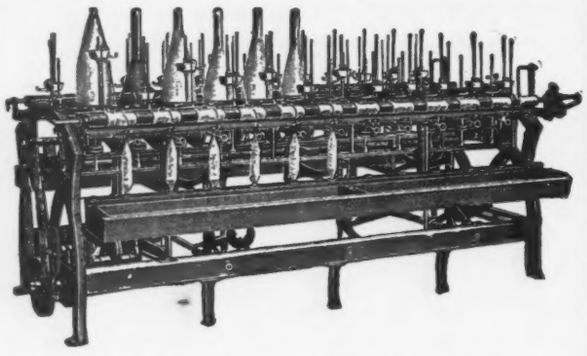
Men's fancies improved slightly, but they are still somewhat backward. Prices were comparatively steady, though certain knitters were reported to be underselling early fall numbers to effect quick turnover. The usual fall interest in men's staples is beginning to register, and knitters received numerous orders for the chief standbys, such as black, white and gray. Rayon is becoming more important at the staples end, though it is still a very small factor, compared to silk.

Children's hosiery moved spirited'y, with active reordering. Wool mixtures and rayon-and-cotton were in eager call; the numbers retailing at 35 cts. to 50 cts. moved the fastest, though there also was a demand for "price" goods, retailing as low as 25 cts. Children's wool-and-rayon hosiery is going quite well, considering that this is a new line; the wool and rayon mixtures have won popularity, and there are indications that this line may become a big feature.

Cotton-Rayon Hose Shows Big Increase

July, 1929, Output Nearly Double Same Month, Last Year, Data Reveals

Hosiery production in the United States during July was about 500,000 doz. pairs, less than June, according to figures just compiled by the Department



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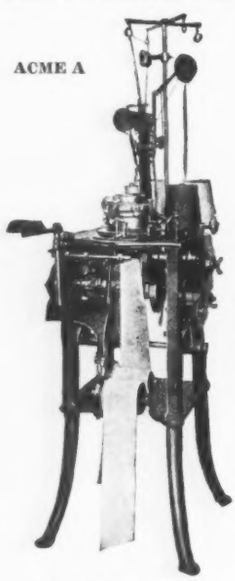
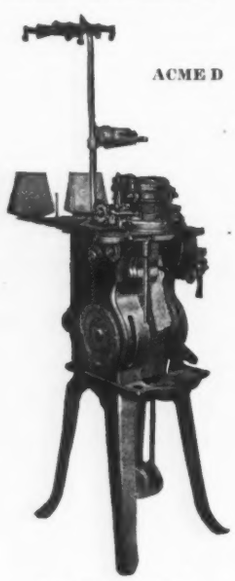


Revolving Cams

ACME D



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of Commerce. The total output for 294 identical establishments, representing 374 mills, in July was 4,487,088 doz. prs., as against 4,965,822 in the preceding month. Another survey, covering 277 establishments, representing 351 mills, showed that July, of this year was well ahead of the same month in 1928 as regards output; the comparative figures stood: July, 1929—4,093,558 as against 3,524,206 for July, 1928.

The survey comparing July in the two years was particularly interesting for the light it threw on the rayon situation. It is shown that rayon hose declined from 408,741 in July 1928 to 403,396 in July 1929, while the cotton-and-rayon mixtures registered a decided jump; the cotton-and-rayon hosiery total was 194,926 in July, 1928, rising to 346,388—almost double—in July, of this year. Silk-and-rayon hosiery also showed a gain, as follows: 224,819 in July, 1929, against 200,154 in July, 1928.

1930 Bathing Suit Business Active

Good Advance Ordering Taken to Indicate Long and Steady Season

Both jobbers and retailers are showing unusual confidence in their bookings for next season, bathing suit producers report. Although the new bathing suit lines were first shown only a few weeks ago, there has been a surprising amount of business placed. Most of the orders for April and May delivery. Knitters are somewhat secretive regarding the preferred patterns in these advance bookings, as they don't want to chance the danger of designs being copied. However, it is very clear that the 1930 bathing-suit season is going to develop unusually early in the season.

Jobbers and retailers are highly satisfied with the good turnover on these garments during the past summer and they are not afraid to commit themselves for next year. Indeed, the advance buying also is inspired by the possibility that a congested situation may develop in spring. At present, of course, the bathing-suit mills are fairly quiet. Production of samples is the order of the day, and real big-scale production of 1930 numbers will not begin until well into the fall.

It is too early to say just what the favored 1930 designs will be; that sunsuits will be important, is obvious; the deep-back suit for women is now virtually a staple. Several knitters said this week that they were selling nothing but this type for women. The speed suit is the big feature in men's lines.

There is no sign of let-up in the heavyweight sweater business. Mills are still producing at capacity, and though they have picked up somewhat in deliveries, spot shipment is at a premium. Two Worth Street factors who enjoy a big weekly turnover said they were booked solid and were taking no new sweater business for four weeks at least.

W. W. Eichhorn Named Field Secretary of Knitted Outerwear Ass'n.

W. W. Eichhorn has been appointed Field Secretary of the National Knitted Outerwear Association, and has already reported at the national office in New York.

Mr. Eichhorn will have the job of maintaining field contacts with membership and of building membership by active solicitation of new members, both in New York and in the field.

He has a background which fits him for effective service to this industry. A graduate of Ohio Wesleyan University (1915), he has been associated as advertising manager and in sales promotion work with several large organizations, including the Goodyear Tire and Rubber Company.

Mr. Eichhorn will be working in the Metropolitan district during the month of September.

S. T. A. Weavers Meet

(Continued from page 33)

suggested as the average for rooms in which rayon goods are woven.

In speaking of the level of light, Mr. Parks stressed the importance of having uniform lighting throughout the mill. This was said to greatly increase the efficiency of human vision. Reflectors should be raised to a height sufficient to allow the overlapping of the cones of light created by individual bulbs. The softness resulting from a diffusion of light makes possible a great reduction of shadows in the room and has a desirable effect upon the efficiency of the workers, it was declared.

Variation in Width

The variation in width of cloth woven on automatic looms was said to be as much as one-half inch, and that lighter construction goods have a tendency to spread more than the heavier counts.

One member stated that it was found necessary to run cloth one-half inch wider in order to be able to guarantee a width of 37½ inches. With a slackened tension of the let-off, in weaving 48x48 goods, 40 inches in width, it was found that the greatest variation was ⅜ of an inch.

Moisture Content After Slashing

It was the opinion of several men present that the majority of mills are drying their warps too much in slashing. One testing laboratory was said to have found that the majority of yarns tested by them showed less moisture in the slashed yarn than in the raw yarn before slashing. It was stated that 235° F. is about the proper temperature for the main cylinder operating at a speed of 40 yards per minute on 30s warp and that 8% moisture should be left in the yarn. However, the experience of several men indicated that it was impossible accurately to determine the degree of drying administered to the yarn simply by maintaining a certain steam pressure on the main cylinder. The advantage of using accurate temperature controls in slashing was clearly pointed out in the discussion.

In one plant, it was stated, after checking it was found that the slashed yarn contained about 5% moisture. Regular per cent-moisture regain tests of yarn from each slasher were then made, using a small conditioning oven for the tests, and after the moisture content reached 10% there was some trouble from mildew. The most satisfactory results were obtained when slashed yarn contained 7 to 8% moisture, and it was also found possible to increase the speed of slashers from 27½ to 40 yards per minute. This mill continues to check the moisture content of yarn from the slashers regularly.

Even when shuttles are in good condition and the bobbins not too large, some trouble was said to have been experienced by filling breaks. It was suggested that this trouble might be caused by the way in which the shuttle enters the box, and the use of a small leather piece in the top of the box was said to help reduce filling breakage.

In slashing acetate rayon yarns, in order to avoid possible delustering or other injury to the material, drying with the cylinder at a lower temperature than in the case of other types of rayon was suggested. It was stated that some mills obtain excellent results by slashing the acetate rayons over drying cans, with the back can covered with heavy canvas.

London Wool Sales Resume

At the opening of the fifth series of London wool auctions Tuesday, a poor selection of wools was on the catalog and withdrawals were heavy, whether from holders refusing to part with their wool at the low prices mentioned or because of actual lack of interest was not evident in the cables. Bradford and French buyers were the chief support of the market. Prices on all sorts offered, scoured and grease, declined 5 to 7½% bringing the general level to a near parity with prices being made in Australia.

L. T. I. Football Team To Play N. Y. City College Oct. 5.

The New York Alumni of the Lowell (Mass.) Textile Institute will hold its annual football game and dinner, Saturday, Oct. 5. The Institute team will play the College of the City of New York at the City College Stadium, New York City. The game will be followed by a dinner-dance at the Level Club, 253 West 73d Street, New York.

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FABRICS

Outlook Improves in Cotton Goods

Active Call For Fine and Fancy Goods—Print Cloths and Sheetings Slow

The confusion which followed the crop report last week has pretty well cleared up, and things look better in the cotton goods market. Buying was general, though limited. Sales of print cloths and sheetings dropped, but this decline was balanced by increased call for fine and fancy goods. There was also some active buying of wide fabrics for the automobile and manufacturing trades.

Prices are firm, with little indication of early weakness. Jobbers buy confidently, and the demand is spread over a wide range. Gray goods improved, and factors reported that the household lines were moving better than at any time this year.

Domestics: The lull which has prevailed in domestics for many months appears to be on the wane. Jobbers cut down buying this summer, due to accumulated stocks. Recently however, they began to clear, and now they have turned to the market with their order-books open. Prices on domestics are firm, with an upward trend. Jobbers are frankly anxious to fill their lines for fall, even at a fractional increase, and they argue little about prices. Blankets, sheetings and towelings all are moving steadily.

Mill Position Improved: It would be exaggeration to say that a seller's market prevails, yet the fact is that the mill position is better than it has been for some weeks. The steady buying of the last three weeks has developed a firm and healthy market; there is less disposition to undersell. Jobbers who seek supplies "at a price" are meeting stiff resistance, and this type of buying seems to be decreasing.

See Trend to Futures: Factors see a trend toward future buying, due to the growing confidence of the market as a whole. A fair amount of early October business has been placed, and the trade is hopeful that this presages a real turn toward buying ahead.

Cotton Goods Quotations

	Sept. 18	Sept. 11	Sept. 19, 1928
Spot cotton, N. Y.	18.60c	18.75c	17.95c
Print Cloths			
27-in., 64x60, 7.60	5½- c	5¼-5⅜c	5⅛-6⅛c
38½-in., 64x60, 5.35	...-7⅛c	7⅛-7⅛c	7½-8 c
39-in., 68x72, 4.75	...-8⅛c	8⅛-8⅛c	8⅛-8⅛c
39-in., 72x76, 4.25	9⅛-9⅛c	9⅛c	9⅛c
39-in., 80x80, 4.00	10⅛-10⅛c	10⅛-10⅛c	10⅛-10⅛c
Brown Sheetings			
36-in., 56x60, 4.00	8⅛c	8⅛c	8⅛-8⅛c
36-in., 48x48, 3.00	10⅛c	10⅛c	10⅛c
37-in., 48x48, 4.00	8⅛c	8⅛-8⅛c	8⅛c
Pajama Checks			
36½-in., 72x80, 4.70	9⅛c	9⅛c	8⅛c
36½-in., 64x60, 5.75	7⅛c	7⅛c	7⅛-7⅛c
Miscellaneous			
Drills, 37-in., 3 yd.	10⅛c	10⅛c	10⅛-11c
Denims, 2.20	17c	17c	17c
Pickings, 8-oz.	22-23⅛c	22-23⅛c	21-22⅛c
Standard prints	9⅛c	9⅛c	9c
Eastern staple ginghams, 27-in.	10c	10c	10⅛c

Broadsilks Spotty; Transparents Quieter

Temporary Lull in Call for Sheer Velvets—Metals Continue Active

Broadsilks presented a varied picture this week, with certain fabrics continuing in demand, and others quiet. Transparents slackened a bit, but the let-up is believed to be temporary. The market still holds to the opinion that the fall demand will bring about a shortage in velvets. Most of the larger weavers are booked far ahead, and cutters and piece goods buyers report growing consumer interest in the rayon pile lines; the indications are that October will be the high-spot month in this range.

Metals Selling From Stock: Several of the principal producers of metallic fabrics have ceased weaving these cloths, and are selling from stock. There is a fair amount of goods on hand, and mills have no difficulty in meeting the current active demand, which is mostly for spot shipment. The cutters show keen interest in the $3.75 to $6 numbers, and the all-over prints are particularly strong.

Satins and Other Staples: High-priced and low-priced business prevails, with little call for medium priced fabrics. The $2.25 satins are moving, but at no great pace. Other staples are steady.

Chiffons and Palm Beach Fabrics: There is a quiet call for a few of the chiffon lines. Palm Beach silk prints are more active, both for spot and future shipment.

Market Tone Firm: The tone of the market is firm, though the month as yet has not been particularly good. Demand during the past week improved, but the warm weather in early September caused a set-back, which threw sales behind. Weavers look to October to bring turnover up to, if not beyond normal figures. Prices held steady for the most part; a few producers of transparent velvets got worried at the current lull and sold low, but this represented a very small part of the market. The outlook is considered satisfactory.

Wool Goods Sampling, But Little Buying

Woolen and Worsted Market Steady —Flannels, More Active, May Stage "Come-Back."

Woolen and worsted cutters and piece goods buyers are still more interested in sampling than in buying. With all the openings now past, weavers are hopeful that some active business will develop shortly. A fair amount of early business on the new fabrics already has been written, but this total is considerably behind the expectations of the trade. Representatives of some mills complain of underselling. They assert that the slow movement of stocks after Labor Day frightened certain firms into price-cutting, with the result that buyers now are even more hesitant than before regarding placing of winter orders.

Overcoatings: Cutters showed more interest in overcoatings; many inquiries were received, and a few fair-sized orders were received, mostly for spot shipment. Overcoatings have been moving at a steady pace this season, with little of outstanding note in the demand.

Flannels: The new spurt in demand for flannels, noted last week, seems to be on the increase. There was further pressure this week, and weavers commented that they thought flannels were "coming back." The indifference toward this line which developed late last spring, left doubts as to the future of flannels, but the current demand would seem to indicate a new interest. Cutters were most interested in the darker shades, such as navy, brown and green; the buying tone was confident, though orders were of limited size. Most of the current flannel business is going into the manufacture of dresses and skirts.

Outlook: Woolen and worsted factors found the week steady but unexciting. The outlook is considered good. Thanks to careful gauging of production, there is little surplus, at present; and weavers are at no pains to clear.

Burlap Trading Light and Spotty

The burlap market was variable during the week. There were flurries of trading, though no great amount of business was done at any time. Toward the middle of the week, demand abated, and prices were uncertain. Cables from Calcutta quoted prices 1d to 3d lower. Some of the futures quotations on currency basis fell sharply; lightweight fabrics declined 10d in certain cases. Spot 8 oz. 40s were at 6.70c. with afloats and October shipments the same. Spot and afloat 10½ oz. 40s were at 8.65c. and October shipments at 8.50c.

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FINANCIAL

Pepperell Increases Net Profits

Increased Strength of Some Leading Textiles —Pacific and Amoskeag Particularly Active

BOSTON, Sept. 18.

THERE has been an active demand for Pepperell over the counter and on the New York Curb since publication of its handsome financial statement for the last fiscal year, transactions being within a range of 104 to 106, with sales at today's auctions at 106½ or an advance of 2½ points from last previous auction sale. Pacific and Amoskeag have been quite active on the local exchange, the former moving up to 33 or an advance of 3 points for the week, while Amoskeag sold up 1½ points to 17 and then reacted to 16¾. Notable advances at today's auctions were 3 points in Boott, ex dividend, at 125; 6 points in Ludlow Associates to 168 and 1½ points in Bates to 97. There was continued liberal offering of Arlington with sales of 423 shares at 27 to 26½, the latter being a decline of 1½ points.

Pepperell's Profit

The Pepperell Mfg. Co., cotton goods, Biddeford and Lewiston, Me., Lindale, Ga., and Opelika, Ala., reports for the fiscal year ended June 30 last net profit after all charges of $1,114,280, equal to $10.32 a share on the 107,930 shares of stock outstanding; this compares with a profit for the 1928 year of $1,026,978, equal to $9.50 a share and a 1927 profit of $980,065, equal to $9.08 per share. The showing made by Pepperell is all the more creditable when it is understood that sales during 1929 were $3,000,000 less than in 1928, the gross for the former year being $16,762,107 and for the latter year $19,803,313; the net profit for the 1929 fiscal year was 6.6% of gross sales, while in 1928 it was only 5.2% per dollar of sales. Net working capital at the close of the 1929 fiscal year was $11,433,909, as compared with $11,957,958 at the end of the previous year. Orders booked in July and August were about 25% ahead of the total for the same period of last year, and Treasurer Russell H. Leonard stated at the annual stockholders' meeting that "evidences are that the Pepperell volume for this year will show a material increase over the fiscal year recently closed." He paid a tribute to the work of The Cotton-Textile Institute and to the splendid leadership of Walker D. Hines, its president, also stating that "under existing anti-trust laws no other methods except those being pursued by the Institute have as yet been devised to adjust production and prices so as to yield an adequate return on the producer's investment." . . . "A pertinent query would seem to be: Should not existing laws be amended so as to permit agreements as to production and perhaps as to price in an industry which for a period of time is in a position where its products are selling at or below cost?"

Financial Notes

The Consolidated Textile Corp. has called a special meeting of stockholders to be held Oct. 14 in Wilmington, Del., for the purpose of approving an increase in the company's common stock, President F. K. Rupprecht declaring in a notice to stockholders that "Prompt action is vital."

The Davis Mills, cotton mills, Fall River, Mass., has omitted the current quarterly dividend, notifying stockholders that business does not warrant payment. This is the first dividend omission by this mill since 1904, the payment for the previous quarter having been 1%.

U. S. Worsted Corp. directors have called a special meeting of stockholders for Sept. 28, to decide upon a plan of defense against the suit of bondholders. On motion of the Old Colony Trust Co., as trustee under which $2,853,100 debentures bearing interest at 6% were issued and are now outstanding, Judge Bishop in the equity sessions of the Suffolk County Superior Court entered an order for judgment in the sum of $3,389,316 against U. S. Worsted Corp., with interest on that sum and costs to be added.

The Davenport Hosiery Mills, Inc., Chattanooga, Tenn., reports for the eight months ended Aug. 31 last, net profits of $262,374 after taxes, equal after preferred dividend requirements to $2.88 a share on the 75,000 no par common shares outstanding; this compares with a net after taxes for the same eight months of 1928 of $132,288, equivalent to $1.15 a share on the no par common. Net sales for the eight months ended August 31 were $2,509,457, as compared with $2,155,571 for the same period of 1928.

Boston Stock Auctions

The following sales of textile shares were made at Wednesday's auctions:

Shrs.	Mill	Par	Price	Change
423	Arlington	100	27–26½	—1½
85	Union, com.	...	15	—3
66	Naumkeag	100	94½–93	+ ½
12	Hamilton Woolen	100	40	—5
50	Connecticut, 1st pfd.	100	28	—5
7	Nashua, pfd.*	100	81½	....
28	Bates	100	97	+1½
20	Ludlow	100	168	+6
15	Nashawena	100	27½	....
49	William Carter, pfd.	100	90	....
10	Boott*	100	125	+3
35	Pepperell	100	106½	+2½
20	American Mfg. pfd.	100	65	+1
820	Total			

*Ex. div.

Quiet Week for Southern Textile Shares

CHARLOTTE, N. C., Sept. 14. — The weekly summary of southern textile shares as furnished by R. S. Dickson & Co. gives the close for the week in the average bid price of 25 most active common stocks at $89.16 as compared with the close of $89.52 per share for the previous week.

The market for both common and preferred shares remained inactive throughout the week with trading quiet.

Textiles on N. Y. Exchanges

The following are the highs and lows and last sales of leading textile stocks listed on the New York Stock Exchange and Curb for the week ended Sept. 14:

Mill	High	Low	Last Sale
Belding-Heminway	11⅛	10½	10⅝
Blumenthal, pfd.	102	99	102
Botany, A	7½	7½	7½
Cannon	47⅞	44	44
Collins & Aikman	43	36	40½
Collins & Aikman, pfd.	91½	88	90½
Consolidated Textile	2⅛	2⅛	2⅛
Courtalds, Ltd.	16⅛	16⅛	16⅛
Dunlap Silk	21¼	20⅛	20⅛
Durham Hosiery	5	5	5
Durham Hosiery, pfd.	45	43	43
Gotham Silk Hosiery	36½	34	35⅛
Kayser, Julius	52⅞	48½	52⅞
Kendall, pfd.	88	87	87
Mallinson	17	16	17
Mallinson, pfd.	85	85	85
May Hosiery, pfd.	29½	29½	29½
Mohawk Carpet Mills	68⅜	63	63
Munsingwear	54¼	53	53½
Pacific Mills	31	30½	30½
Phoenix Hosiery	23	23	23
Real Silk Hosiery	76	75	75
Real Silk Hosiery, pfd.	100	97	97
Tubize	379	350	379
United Piece Dye	41½	36½	40
Van Raalte	42	42	42
Van Raalte, 1st pfd.	82⅛	82⅛	82⅛

Amer. Mohair Producers Ass'n Gets Charter

AUSTIN, TEX.—The American Mohair Producers Association of Uvalde, Texas, has been granted a charter, the association having for its purpose the standardization of the mohair industry in order to receive the benefits of the Federal farm act.

Roy J. Davenport, of Uvalde, is president and Bob Davis, of Rio Frio, is secretary. A meeting is to be held soon to complete the organization. Clarence W. Payne, San Antonio attorney, who prepared and filed the charter, says that the estimated mohair production in Texas this year is 15,000,000 lb.

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TESTERS

COTTON YARNS

Active Spot Yarn Demand

Mills Delay Buying Until the Last Minute

PHILADELPHIA.

THERE was an active demand for spot yarns for both weaving and knitting late last week but this became less noticeable this week although a fair request for yarns for immediate delivery is still apparent. The market is sensitive to changes in the cotton market and since the rapid decline in the raw material market following the crop report demand for yarns has been tapering off. Yarns are holding firmer than cotton and indications are the strong spot situation in spinners' favor will cause this to continue for some time ahead.

There is no question but that many manufacturers need more yarn for use during the balance of this month and October than they have already purchased and their conservative buying, refusing to cover needs more than three or four weeks ahead, is keeping stocks of spot yarns in spinners' and dealers' hands at a low level. Dealers report being able to sell yarns for shipment out of local stocks at a cent more than they can obtain for the same spinning when delivery comes from the mill.

Little Future Buying

Manufacturers are willing to buy fair-sized quantities out of stock but are more reluctant than for many months to buy ordinary carded yarns for delivery far ahead. Dealers specializing in carded knitting yarns for the up-state underwear trade report booking a large volume of business late last week and the first two days of this week, but state this was for delivery either from dealers' or spinners' stocks, preferably the former. This trade wants yarn immediately and those not in position to make such delivery are losing business.

The up-state trade has been taking fair-sized quantities of heavy and medium-weight counts for quick delivery, indicating these manufacturers stayed out of the yarn market as long as they possibly could and then finding it impracticable to postpone buying any longer specify immediate delivery of a large portion of the yarns they are now taking. They are taking 8s to 20s for these goods and stocks of such counts in local warehouses are small. Sales have been made this week at 30c. to 31c. for 10s, depending on the quality yarn wanted. There is little interest in lightweight knitting counts.

Improvement in sales of weaving counts has been less noticeable this week, having become smaller in volume as compared with last. There has been little change in prices at which yarns are selling or in spinners' quotations, the latter holding 20s-2 warps of ordinary descriptions at 35½c. to 36c. and 40½c. to 41c. for 30s-2. Sales during the last ten days have been at 35c. for 20s-2 for ordinary grade and at 40c. for 30s-2 as minimums. Spot supplies of 30s-2 are small and dealers are able to obtain half to full cent more for this count coming out of local stocks than for future delivery.

Plush Yarns Sluggish

Quiet demand for yarns to go into plushes is still apparent. There is a fair request for yarns to go into backing, but there is little interest in counts and qualities used for the pile. These mills are taking small lots from stock and the counts in most active demand are 12s-2 to 20s-2 rather than 20s-2 to 30s-2

Cotton Yarn Quotations

Carded—(Average Quality)

Double Carded Weav'g and Knitt'g Yarn 2c. to 4c. Higher According to Quality

SINGLE SKEINS OR TUBES—(WARP TWIST)

4s to 8s	$0.30½–$0.31	20s	$0.34½–$0.35
10s	.31 – .31½	24s	.36½– .37
12s	.31½– .32	26s	.38 – .38½
14s	.32 – .32½	30s	.39 – .39½
16s	.33 – .33½	40s extra quality..	.52 – .53

TWO-PLY SKEINS AND TUBES

8s-2	$0.31 –$0.32	26s-2	$0.38½–$0.39
10s-2	.32 – .32½	30s-2	.40 – .41
12s-2	.32½– .33	36s-2	.44 – .45
14s-2	.33 – .33½	40s-2	.47 – .48
16s-2	.33 – .34	40s-2 high break..	.51 – .52
20s-2	.34½– .35½	50s-2	.54 – .55
24s-2	.37½– .38½	60s-2	.62 – .63

SINGLE WARPS

10s	..... $0.31½	24s	$0.37 –$0.37½
12s	..... .32	26s	.38 – .39
14s	..... .32½	30s	..... .40
16s	$0.33½– .34	40s extra quality..	.52 – .53
20s	.34½– .35		

TWO-PLY WARPS

8s-2	$0.31½–$0.32	24s-2	$0.38 –$0.38½
10s-2	.32½– .33	26s-2	.39 – .39½
12s-2	.33 – .33½	30s-2	.40 – .41
14s-2	.33½– .34	40s ordinary	.47½– .48½
16s-2	.34 – .35	50s-2	.54 – .55
20s-2	.35 – .36	60s-2	.62 – .63

8s-3 and 4-ply skeins and tubes; tinged, .27½–.28; white, .29½–.30; waste, .26½–.27

HOSIERY CONES (FRAME SPUN)

8s	$0.30 –$0.30½	22s	$0.34 –$0.34½
10s	.30½– .31	24s	.35 – .35½
12s	.31 – .31½	26s	.35½– .36½
14s	.31½– .32	30s tying in	.36 – .37
16s	.32 – .32½	30s regular	.37 – .38
18s	.32½– .33	30s extra quality..	.39½– .40½
20s	.33½– .34	40s	.46 – .47

Combed Peeler—(Average Quality)

WARPS, SKEINS AND CONES

	Merc. Tw.	Wp. Tw.		Merc. Tw	Wp Tw.
20s-2	$0.46	$0.49	60s-2	$0.66	$0.68
30s-2	.51½	.52	70s-2	.77	.79
36s-2	.53	.55	80s-2	.88	.93
40s-2	.54	.56	90s-2	1.07	1.10
50s-2	.59	.61	100s-2	1.30	1.40

SINGLES

12s	$0 40½–$0.41	30s	$0.50 –$0.51
14s	.41 – .41½	38s	..... .52½
16s	.41½– .42	40s	..... .53½
18s	.42½– .43	50s	.60 – .61
20s	.43½– 44	60s	.66 – .69
24s	.46 – .46½	70s	.77 – .79
28s	.48½– .49	80s	.90 – .93

MERCERIZED CONES—(COMBED, UNGASSED)

26s-2	$0.60 –$0.62	80s-2	$1 09 –$1.12
30s-2	.61 – .63	90s-2	1 45 – 1.50
36s-2	.64 – .66	100s-2	1.75 – 1 80
40s-2	.66 – .68	120s-2	2.15 – 2.20
45s-2	.71 – .73	Singles	
50s-2	.73 – .75	30s $0.83	60s $1.07
60s-2	.82 – .85	40s ..... .88	70s 1.22
70s-2	.97 – 1.00	50s ..... .95	80s 1.52

COMBED REVERSE TWIST THREAD YARNS—SKEINS, TUBES OR CONES, 2, 3 AND 4-PLY

	Peeler Average	Peeler Best	Sakelarides Average	Sakelarides Best
24s	$0.56 –$0.57	$0.62 –$0.63	$0.79	$0.84
30s	.59 – .60	.65 – .66	.82	.87
36s	.61 – .62	.67 – .68	.85	.90
40s	.66 – .67	.71 – .72	.88	.93
45s	.71 – .72	.76 – .77	.93	.98
50s	.76 – .77	.81 – .82	.98	1.03
60s	.86 – .87	.91 – .92	1.08	1.13

Quotations are average prices of the counts and qualities indicated at the close of business, Sept. 18. They do not cover lower or higher qualities unless specifically noted. For New York Spot Cotton prices, see page 83. For staple cotton prices, see page 85.

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BOSTON, MASS.

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LOS ANGELES

MILLS

CHESTER, PA.

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ABERFOYLE MANUFACTURING COMPANY

Representatives in All the Principal Countries of the World

which was the former popular range of numbers specified by this trade.

More manufacturers of plushes here are installing jacquard looms and demand for the types of yarns going into jacquard plushes is increasing. There is more activity among mills making tapestry, several of the larger concerns of this type being busier than they have been for several years. They are taking 20s-2 and 30s-2 warps more actively.

While there has been a better interest in two-ply combed yarn from weavers there has been no improvement in sales to mercerizers. As mercerizers take about 90% of the two-ply combed and weavers the smaller amount, combed spinners are eagerly awaiting the time when mercerizers come into the market to cover at least a portion of the mercerizers yarn business closed three weeks ago when it has been estimated about 20,000,000 lbs. of processed yarns were sold, bulk of this going to hosiery manufacturers. Mercerizers have been running on old contracts which had not been completed and using stocks that had accumulated during the dull period. They have not bought because they feel further reductions in combed will come when the new long staple crop comes on the market.

No Large Combed Stocks

Combed spinners in Gaston County report carrying smaller stocks than at any time this year and smaller than their average stocks for the last five. These spinners while not busy are keeping their inventories in better shape than heretofore and as a result it will be more difficult for large buyers to obtain bargain prices from spinners for large quantities of stock yarn as has been frequently true in the past. Combed prices are firm at the lower levels that have been quoted during the last two weeks and sales to weavers are reported at these figures. Single combed yarns are firm, selling at 42½c. to 43c. for 18s. Demand has been active but less so than last week, fewer large buyers having been in the market.

Demand at a Price

But at Full Prices Cotton Yarns Continue Dull

BOSTON.—Evidently the majority of cotton yarn users take little stock in the correctness of last week's Government cotton report, for few of them have been interested in the market since then excepting at price concessions and this attitude and dullness is continued this week. Possibly the reduced prices named last week by southern spinners on combed yarns have encouraged buyers of carded yarns to wait for concessions, but thus far spinners are holding prices firmly for both prompt and forward delivery. The major portion of the small business moving is for near delivery on a basis of seldom less than 35c. for 20s-2 carded warps of average quality, 40c. for 30s-2 and 30½c. for 10s frame spun cones.

A feature of the market on medium count carded yarns is the relatively duller demand and price position for high grade than lower quality yarns. For instance, it is possible to buy plush and other high qualities of 30s-2 carded warps at 41 to 41½c., whereas average qualities are firm at 40 to 40½c. with ordinary qualities held almost as firmly as the latter. This is partially due to the dull demand for high qualities, and also to the fact that basis on the cottons used in such yarns is relatively higher than on shorter and longer lengths, with the probability that this situation will hold to the end of the season.

While some spinners have not followed price concessions on combed yarns, there is no evidence that buyers are more interested than they were last week. Medium and coarse counts are relatively firmer in price than counts from 50s to 80s, this being partially reflective of the price situation of cottons used in these various counts; anything longer than 1⅛ inch cotton is about as cheap as it was a year ago, whereas basis on 1⅛ inch in strict low middling and higher grades is as high as as at any time last season with the relative scarcity of such cottons in the new crop promising to be acute.

Yarn Buyers Bearish

Await Developments in Cotton Before Placing Their Yarn Orders

CHARLOTTE, N. C.

FURTHER declines in raw cotton prices have resulted in decreased activity in combed yarns, as buyers are decidedly bearish and prefer to await developments in the cotton market, feeling that the crop will be considerably larger because of favorable weather.

Substantial business was transacted in carded yarns early in the week, and dealers stated that inquiries had been plentiful although buyers not requiring immediate shipments often were inclined to delay purchases in anticipation of lower prices. Carded yarn spinners, on the other hand, were insisting on top prices, intimating that quotaitons should be advanced particularly on numbers that are enjoying an active demand.

Combed yarn spinners reported more business on their coarser numbers for mercerizing, while reverse twist yarns were being sold in fair quantities.

Mercerizers state that there has been a stimulation of demand for processed yarns and at prices allowing fair margins. Mercerized 60s-2 combed peeler cones were quoted at 82c.

Transactions in 20s-2 warps at 35 to 36c., 24s-2 at 38c. and 30s-2 at 41 to 42c. were reported by dealers. Sales of single combed peeler yarn on cones were reported early in the week at 48c. for 28s, 51 to 52c. for 36s, 65c. for 60s and 85 to 86c. for 80s. Reverse twist combed yarns were slightly lower, 36s-2 bringing 60c., 30s-2, 58c. and 45s-3, 69c. for average quality. Warp twist combed yarns were strong, 60s-2 being quoted at 70c.

Chattanooga Yarn Market Is Quiet

CHATTANOOGA, TENN.—Another advance in the price of silk was the chief development of the week ending Sept. 14 here. During the period the price on thrown silk double extra advanced about 5c. a pound and as the week closed was being quoted by local brokers on the basis of $5.85.

Dullness prevailed during the entire week in both the thrown silk and cotton yarn fields. There were no changes in prices in the cotton field. Mercerized 60s-2 is offered 82c., while 20s-2 is 58c. and 80s-2 at $1.09.

Brokers are listing 10s, carded cones, at 30 to 31c. with 20s at 32½ to 33½c. Combed singles range in price from 42 to 43c. for 18s, to 77 to 79c. for 70s.

Bacon Purchases Byles' Interest in Southern Mercerizing Co.

F. P. Bacon has purchased the interest of C. A. Byles in the Southern Mercerizing Co., Tryon, N. C., according to a recent announcement. Mr. Bacon is senior member of the firm which also owns the Southern Thread Mfg. Co., of Tryon. Mr. Byles states that he is taking an extended vacation and that his plans for the future will not be made public at this time.

Cotton Yarns Spotty

Active Call From Insulating Trades Brings Encouragement to Spinners

NEW YORK.—Cotton yarns were generally spotty, with some spirited buying at certain ends. The insulating trades showed steady interest and placed considerable business. Some firms reported a good call for most of the carded yarns; one company cited numerous orders for 1,500 and 2,000 lb. lots. Prices in this range held firm, and buyers were not disposed to put up any argument. Prices took an upward trend on spot orders, but generally there was no advance.

Hosiery cones varied somewhat. A few firms were so eager for business that they cut ½c. off quotations, but with these exceptions prices were unchanged. Factors are very dissatisfied with the

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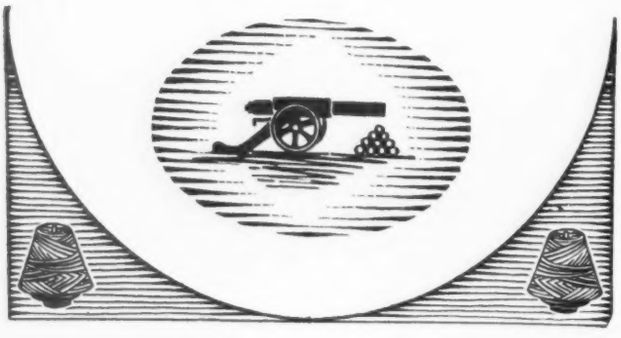

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Fine Yarns

COTTON	RAYON
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Representing Leading Spinners of Every Type

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FALLS MANUFACTURING COMPANY

High Grade Combed Peeler Yarns

Manufactured where climatic conditions are ideal.
Made especially for Ladies' Fine Gauge Underwear.

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Granite Falls, N. C.
Selling Agent, P. L. Gilkey, Lafayette Bldg., Phila., Pa.

GATE CITY
COTTON MILLS

WHITE KNITTING YARNS ON CONES

SOLD DIRECT

P. O. BOX 1677
ATLANTA, GA.

September turnover; it has been decidedly below normal, and there is a lack of the usual September confidence. Buyers are limiting themselves to immediate needs, whereas in other years they usually placed orders in September for delivery in November and December.

Cotton Waste Prices Firmer

Strength in Cotton Rather Helpful —Cheap Waste Imports

BOSTON.—As generally anticipated the government crop estimate was bullish but the prospect of 14,825,000 bales did not cause any particular ebullition of bullish sentiment. The general effect of the report on the waste market was to confirm the confidence which has been growing recently that the cotton situation is fairly satisfactory and that on this basis, as the season progresses, wastes will rise to a better selling level.

There was some speculative buying by traders and dealers of spinning stocks in anticipation of a bullish estimate. If they can turn over their commitments to consumers in the near future while cotton remains firm they may no doubt reap a trifling profit. No one claims to be making money in the cotton waste trade these days and yet the balance of the year may turn out better than the first six months of the year. As one favorable feature, a larger activity is noted in the thread section of the market which for many weeks has been slow and easy in price. The best white threads are now quoted 10c. and the best colored threads 8½c.

The waste market has a long way to go before spinning stocks arrive at anything like a normal relation to the basic price of cotton. Mills are paying quite high prices for staple cotton at this time and it seems rather remarkable that good comber should be so sluggish. No large Manchester demand has appeared since the Lancashire operatives went back to their mills. This is a situation of affairs that may show a turn for the better any time.

There is little difference in the price of cotton at this time as compared with a year ago but those who handle spinning stocks know well how much lower are these materials. Continued imports of low-priced wastes at the chief ports of entry occasion surprise in some quarters. They are running well above imports of high-priced material, it is said. Cotton waste imports into Boston for June totaled 339,000 lb.; into Philadelphia 612,000 lb.; into New York 1,265,000 lb.

Current Quotations

	Cents
Fooler comber	14½—15½
Peeler strips	14 —14½
Silk comber	13½—14
Choice willowed fly	7½— 8
Choice willowed picker	6 — 6½
Silk strips	17½—18
Linters (mill run)	4½— 5
White spooler (single)	10 —11

A New Wool Substitute

Vegetable Fiber Undergoes Special Process Devised by M. J. Ross

The Woolike Mfg. Co., M. J. Ross, president, is about to set up a plant in Long Island City, N. Y., for the production of a fiber of vegetable origin which may be used in mixture with wool or alone in the making of a variety of textiles. The grass from which the fiber is derived is grown in Siam and may ultimately be grown in the southern part of the United States. The Woolike company plans for a daily output of 50,000 lb. of prepared fiber which will later be increased.

The fiber has resiliency and probably good spinning qualities. When it was shown by a representative of TEXTILE WORLD to Lyster H. Dewey of the Bureau of Plant Industry, Department of Agriculture, he identified it as of the ramie family. Mr. Dewey has made a special study of this plant, and has met its fiber under different names though he states that it might well be sold on its own merits because it has distinctive characteristics. He believes that an admixture of ramie should improve certain wool fabrics because of ramie's strength and firmness.

M. J. Ross in discussing his company's product, stated that the raw fiber after extraction, is treated chemically at a temperature of 110° C. to give it increased strength. This particular process has been discovered by him and he finds that it will increase the strength of any vegetable fiber by 20 to 30%, he states. It may be, he said, that this process will be used to treat other fibers than those sold under his brand, "Woolike." Mr. Ross states that his fiber is three times stronger than cotton, and that it gains considerably even over this initial strength, when wet. He states that the fiber itself may be waterproofed or fireproofed, and that it will retain these characteristics when made up into fabric.

Among the woolen attributes possessed by his fiber, Mr. Ross points particularly to its felting qualities.

Mr. Ross has done considerable research in fields allied to textiles and he has been much encouraged by men within the industry as to the utility of his new fiber. It has been examined by a number of men and the following quotations from letters to Mr. Ross indicate their attitude:

R. G. Knowland, assistant to the president in charge of production, Bigelow-Hartford Carpet Co., Thompsonville, Conn., writes "After examining the fiber which you submitted, I believe that it will be very useful for blending with carpet batches as a wool substitute."

J. G. Doten, general merchandise manager, American Felt Co., Boston, Mass., after examining the fiber wrote, "We have compared it with raw stocks that we use and we believe that there are several places where we could use similar stock in our various mixtures."

G. A. Slifer, Wellington, Sears & Co., New York, states that, "Assuming that it will be found possible for cotton mills to properly card and spin same on the machinery which is now available, we believe that this material at the present price mentioned by you will be useful in the manufacture of a number of cotton fabrics now on the market." In this connection he mentions flannels, shirtings, trouserings, upholstery fabrics, and fabrics for the automobile and rubber trades.

Samples of a 50-50 mix of sheep's wool and Woolike were dyed by John Campbell & Co., with red and blue dyes and the shades took equally well on both materials. The dyeings were made with 20% glauber's salt, three-quarters of an hour boil, addition of 1% sulphuric acid, and a further quarter of an hour boil.

United States Civil Service Examinations

The United States Civil Service Commission announces the following open competitive examinations: Senior Home Economics Specialist, $4,600 to $5,200 a year; Home Economics Specialist, $3,800 to $4,400; Associate Home Economics Specialist, $2,600 to $3,100; Assistant Home Economics Specialist, $2,600 to $3,100.

Applications must be on file with the Civil Service Commission at Washington, D. C., not later than Oct. 16.

Competitors will not be required to report for examination at any place, but will be rated on their education, training, and experience, and on a thesis or discussion.

Full information may be obtained from the United States Civil Service Commission, Washington, D. C., or from the secretary of the United States Civil Service Board of Examiners at the post office or customhouse in any city.

Another Big Week on N. Y. Silk Exchange

New York has assumed a commending lead as the world's raw silk center through the rapidly broadening activities of the National Raw Silk Exchange. Transactions on the Exchange during the week ended Sept. 14 broke all previous records, sales totaling 8,590 bales, which was 130 bales over the previous weekly record and 3,550 bales in excess of the week's turnover on the Yokohama exchange, formerly the leading world raw silk market.

The total value of raw silk traded on the local Exchange last week was more than $7,500,000, more than three times the aggregate sales on the Exchange during its first week's trading, in September last year.

Total sales on the Exchange for the first 11 trading days of September have totaled 14,355 bales, this being more than the entire month's sales during July this year.

M E R R O W I N G

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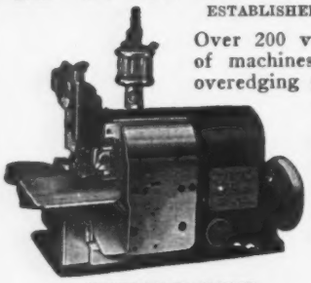

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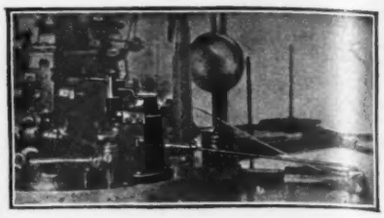

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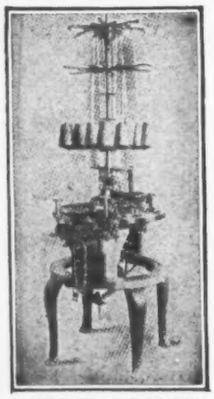

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We announce to the knit goods trade that both our new Latch Needle Sweater and Toque Machines, after severe and protracted tests, have proven unqualified successes.

Sweater machines knit plain, half, and full cardigan, stripe, rack and have separating course.

Toque machines automatically stripe three colors on ribbed fabrics.

TOMPKINS BROS. CO.

SYRACUSE, N. Y. *See also* CONSOLIDATED TEXTILE CATALOG

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COTTON

Cotton Wavers on Trend

Uncertainty of the Crop on One Hand And Increasing Receipts on Other

THE cotton market has appeared to be pretty well balanced between the uncertainty of an adequate crop and certainty of increasing receipts with a corresponding increase of hedging. Evidently the Government report as of Sept. 1 did not eliminate the hope of an adequate yield, owing partly, no doubt, to the breaking of the Southwestern drouth shortly after the first of the month. There are differences of opinion as to whether these rains came in time to add materially to the crop, but it is believed they checked deterioration and that the outlook is for either a well maintained indication or a moderate increase if weather conditions are favorable from now on.

The addition of 200,000 or 300,000 bales to the Sept. 1 crop indication through a favorable autumn and unusually late killing frost, would bring the indicated available supply for the season up to about last year's total when the price of middling cotton in New Orleans averaged 18.92c. With the market here selling in the neighborhood of 19.00c. for the spring months, this comparison probably has a tendency to check speculative buying and the market has been quiet enough to suggest a disposition to await the further development of the crop or for the effects of increasing available supplies.

If anything, the tendency has been toward a moderate upward revision of carry-over figures. This, of course, has been due to the report of the International Federation placing the world's consumption of American lint cotton at 15,076,000 bales for the last season, or about 200,000 bales below general expectations. One of the leading trade authorities now estimates that the world's carry-over was 4,474,000 bales and the idea in some quarters is that this might be reduced another 100,000 or perhaps 200,000 bales during the present season without any great disturbance of values. It remains to be seen, of course, whether the more optimistic views of the crop will be realized. If there is a chance of favorable weather during the autumn, there is certainly a possibility of the reverse while the crop has still before it the possibility of an early killing frost.

Quite obviously figures on the prospective supply based on the Government's forecast of Sept. 1 are close enough a fit when compared with the world's consumption, to make a comparatively small revision a matter of considerable importance. Should the estimate be cut 200,000 or 300,000 bales, the effect on prices would probably appear disproportionate, while should the estimate be increased by such an amount, the expectation of a decline as the available supply approached the peak of the season would naturally be strengthened. No doubt the attitude of buyers for consumption toward the early new crop movement, will depend partly upon the further shaping up of crop prospects. With good weather and increasing confidence in crop ideas of 15,000,000 bales or slightly over, they would probably continue to buy slowly, while with bad weather and a tendency to reduce estimates, they might easily absorb the full weight of the movement at sustained or higher prices.

There seems nothing wrong with the outlook for ultimate distribution. In this country the cotton goods situation is considered satisfactory with every prospect of another season of activity in the cotton mills. Lancashire is now sending in rather more favorable reports, and, generally speaking, the trade is still approaching the outlook as pointing to world's mill consumption of between 15 and 15¼ million bales for the present season.

Weather conditions during the week have slowed up picking and the movement, but, on the whole, the crop seems to have made fairly good progress. Some improvement has been reported in the demand for spot cotton for prompt shipment, but while it has been in scattering and rather small lots, Southern hedge selling in futures seemed more or less persistent and in rather larger volume. There is a feeling in some quarters that supplies of inch cotton are likely to be relatively small this season and toward the end of this week, somewhat better demand was said to be developing for $\frac{7}{8}$" cotton.

The following table shows Wednesday's closing quotations in the leading spot markets of the country with the usual comparisons:

Markets	Sept. 11	Sept. 18	Change	Last Year	Sales
Galveston	18.55	18.60	+ 5	17.45	4.895
New Orleans,.	18.39	18.23	—16	17.12	51.472
Mobile	17.90	17.85	— 5	17.00	3.358
Savannah	18.11	18.07	— 4	17.13	11.882
Norfolk	18.75	18.50	—25	17.31	1.242
New York	18.75	18.60	—15	17.95	5.469
Augusta,.	18.06	17.94	—12	17.38	6.447
Memphis	17.40	17.30	—10	16.65	23.564
St. Louis	17.75	17.75	....	16.50	.....
Houston,,.	18.55	18.65	+10	17.25	65.822
Dallas	17.75	17.70	— 5	16.70	87.861

The following differences on and off middling are given as compiled from the report received by the New York Cotton Exchange. The cotton grades marked** are not deliverable on contract:

	Dallas	Memphis	Montgomery	Augusta	Average
WHITE GRADES					
M. F	1.00†	.90†	.70†	.63†	81†
S. G. M	.70†	.65†	.55†	.50†	.62†
G. M	.45†	.40†	.40†	.38†	.44†
S. M	.35†	.25†	.25†	.25†	.30†
S. L. M	.75*	.65*	.75*	.75*	.75*
L. M	1.75*	1.60*	1.50*	1.50*	1.60*
S. G. O**	3.00*	2.50*	2.50*	2.25*	2.50*
G. O	4.00*	3.50*	3.50*	3.00*	3.40*
YELLOW TINGED					
G. M	.50*	.75*	.50*	.25*	.45*
S. M	1.00*	1.15*	.75*	.75*	.92*
M**	1.75*	1.50*	1.25*	1.50*	1.58*
S. L. M.**	2.50*	2.00*	1.75*	1.88*	2.21*
L. M.**	3.25*	3.00*	2.50*	2.88*	3.01*
YELLOW STAINED					
G. M	1.50*	1.40*	1.25*	1.25*	1.42*
S. M.**	2.25*	2.15*	2.00*	1.75*	2.14*
M.**	3.00*	2.65*	2.75*	2.50*	2.79*
BLUE STAINED					
M. G.**	1.75*	1.25*	1.50*	1.75*	1.61*
S. M.**	2.25*	2.00*	2.25*	2.50*	2.25*
M.**	3.00*	2.50*	3.00*	3.50*	2.97*

*Off middling. †On middling.

Cotton Statistical Data

(Fluctuations of Futures)

	Closed Sept. 12	For High	Week Low	Closed Sept. 18	Net Change
September..	18.55	18.74	18.41	18.38	—.17
October	18.60	18.85	18.45	18.42	—.18
November..	18.69	18.92	18.62	18.59	—.10
December..	18.96	19.18	18.77	18.79	—.17
January	18.94	19.17	18.77	18.81	—.13
February	19.04	19.25	18.93	18.98	—.06
March	19.17	19.43	19.02	19.09	—.08
April	19.26	19.47	19.16	19.18	—.08
May	19.35	19.60	19.19	19.28	—.07
June	19.29	19.50	19.19	19.21	—.08
July	19.24	19.45	19.08	19.16	—.08

Spot Fluctuations for Week

(Middling)

	New York	New Orleans	Liverpool
Friday, Sept. 13	19.00	18.55	10.32
Saturday, Sept. 14	18.70	18.26	10.36
Monday, Sept. 16	18.70	18.30	10.22
Tuesday, Sept. 17	18.70	18.30	10.28
Wednesday, Sept. 18	18.60	18.23	10.31
Thursday, Sept. 19	18.65	18.23	10.22

Spot Fluctuations and Stocks

	Prices Sept. 18	Stocks This Week	Stocks Last Year
Galveston	18.60	144,842	238,956
New Orleans	18.23	133,355	97,844
Mobile	17.85	30,369	5,645
Savannah	18.07	71,825	26,159
Norfolk	18.50	16,766	14,265
New York	18.60	103,483	11,710
Houston	18.65	251,189	292,614
Augusta	17.94	51,214	18,164
Memphis	17.30	60,195	59,370
St. Louis	17.75	5,184	1,928
Little Rock	17.32	8,120	6,655
Dallas	17.70	.....	.....
Montana	17.50	.....	.....
Forth Worth	17.70	.....	.....

Cotton Exchange Sets 250,000 Bales Limit for Futures Holding

The Board of Managers of the New York Cotton Exchange has fixed 250,000 bales as the limit of interest in futures contracts which may be held for delivery in any one month by any individual, firm or corporation. This is unchanged

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from the limit which has been in effect.

The action of the board was taken in compliance with section 114 of the by-laws of the exchange which provides that the board shall meet to consider the limitation of interest within five days after the issuance of a Department of Agriculture acreage or condition report between the months of July and December. Such a report was issued Monday.

More Activity in South

First Hands Are Hard to Deal with Since Report

MEMPHIS, TENN., Sept. 16.—Sales, 22,366 bales, would indicate that this cotton market experienced a fairly active week; shippers deny that forward business has picked up perceptibly. They say they are getting numerous small orders, all pressing for immediate shipment but that mill ideas as to basis on deferred deliveries are such that it is impossible to meet them. It is quite possible however, that shippers are booking more forward business than they are willing to admit; that, at this season, is nearly always a safe assumption. It is certain, however, that much less than the usual volume of forward business has been booked.

Some shippers are still working on old commitments, on which they were granted an extension of time, while others are buying for stock. First hands are extremely hard to deal with, especially since the Government estimate, although disappointing market response induced somewhat freer offerings towards the close of the week. Most of the offerings were in the nature of distress cotton to provide funds to meet immediate and urgent requirements.

Opinion is not much inclined to the idea that the crop prospect, in this territory, is materially different from what it was at the date of the Government estimate; there are some claims of local improvement but just as many of excessive deterioration; each is probably well founded, owing to the very spotted condition as to plant progress and development, which existed at Sept. 1. The most that can be said is that crops generally have been freshed by recent rains; some new growth has started but is slow, owing to unfavorably low temperatures. Killing frost will be due in about seven or eight weeks; first frost has occurred as early as Oct. 9—in 1917—but the average date is about Nov. 10; about 60 days are required between the first appearance of a square and a safe boll.

Last year, owing to exceptionally favorable weather, much new fruitage was developed during October, but beneficial rains, which revived the plant, were received about August 15, nearly a month earlier than was the case this year. The weather during the week, while partly favorable for harvest, was the most unfavorable so far this season. Considerable rainfall occurred in nearly all sections of the belt. Only moderate progress was made in picking and ginning. The staple is good and there is less complaint of poor outturn.

Market Statistics

Basis Middling

	Saturday Sept. 14	Saturday Sept. 7
10 Markets average	17.96	18.27
Memphis	17.30	17.75

Premium Staples

First Sales from Factors Tables at Memphis

Grade Strict Middling	Prices Steady
1⅛-in.	20.00@20.25c
1-7/32in.	21.00@21.25c
1¼-in.	24.25@24.75c

Current Sales

	For Week	Previous Week	Week Before
Memphis total	22,366	14,846	7,678
F.o.b. included in total	20,690	1,581	7,525
10 markets	221,943	131,846	112,075

Memphis Receipts, Shipments, Etc.

	For Week	Last Year	Year Before
Net receipts	9,013	2,614	3,806
Gross receipts	21,779	6,307	12,923
Total since Aug. 1, net	13,453	6,131	11,804
Shipments	14,513	9,281	15,497
Total since Aug. 1	53,368	58,517	77,954
Total stock	44,452	54,234	56,583
Increase for week	7,266	*2,874	*2,574
Unsold stock in hands of Memphis factors	6,444	.....	.....
Increase for week	1,386	.....	.....

*Decrease

Extra Staple Cottons Dull

Shorter Staples Most Active with Basis Firm

BOSTON, Sept. 18.—There has been a noticeable tendency on the part of many shippers to raise asking prices for basis as futures weakened and this has been sufficient to discourage such added interest as some spinners may have shown in the market. Basis on 1 1/16 to 1⅛ inch cottons is, if anything, a little weaker than last week, but on anything longer than commercial 1 1/16 inch it has hardened and premiums for grades above low middling have also strengthened. The strongest and most active part of the cotton market is on 1 to 1 3/32 inch cotton in strict low middling and middling grades; tire manufacturers are reported to be active buyers of such cottons.

Prices of Egyptians have fluctuated within comparatively narrow limits during the week with a net decline about equal to that in domestic futures. Some interest is being shown by domestic spinners in Sak. of high grade, but Uppers are neglected by the domestic trade. Most of the large tire manufacturers have stocks of Uppers sufficient to cover their needs into the new year and are showing little interest even in December shipments. This lack of American support has had no appreciable effect upon the Alexandria market thus far, but may if it fails to develop within the next two months.

Current Quotations

Average prices for Oct.-Nov. shipment of middling and strict middling hard western cotton (Government lengths) are as follows:

	Middling	St. Middling
1 1/16 in.	21⅛ to 22c.	22 to 22⅛c.
1 1/16 in. to 1⅛ in.	21¼ to 22⅛c.	22⅛ to 22⅜c.
1⅛ in.	22⅛ to 23c.	22⅜ to 23⅛c.
1 3/16 in.	24⅛ to 25c.	25 to 25⅛c.
1¼ in.	28 to 29c.	29 to 30c.

Basis on New York, December, 18.77c.

John Malloch & Co., Boston, quote Egyptian cotton c.i.f. Boston for Oct.-Nov. shipment as follows: "Fully good fair" Sak. 37.10c., off 0.44c. "fully good fair to good" Uppers 24.20c., off 0.65c. from Sept. 11. They report closing prices Sept. 18 on the Alexandria exchange as follows: Nov. Sak. $33.59, off 45c.; Oct. Uppers $21.18, off 33c. from Sept. 11.

Cotton Consumption and Active Spindles

The Department of Commerce, Bureau of the Census, Washington, D. C., has issued the August report of cotton consumed, on hand, and active cotton spindles. (Cotton in running bales, counting round as half bales, except foreign, which is in 500-pound bales.):

	Year	Cotton Consumed During August (Bales)	Cotton Consumed During 12 Mos. Ending July 31 (Bales)	Cotton on Hand Aug. 31 In Consuming Establishments (Bales)	Cotton on Hand Aug. 31 In Public Storage and at Compresses (Bales)	Cotton Spindles Active During Aug., (Number)
United States	1929	558,113	7,098,946	802,200	1,387,187	30,236,880
	1928	526,340	6,834,063	781,470	1,141,283	28,217,138
Cotton-growing states	1929	428,382	5,400,890	496,365	1,199,902	17,954,338
	1928	403,431	5,113,842	428,537	1,042,850	17,695,082
New England states	1929	108,820	1,446,693	255,544	68,141	11,010,354
	1928	102,595	1,438,431	304,219	77,210	9,220,666
All other states	1929	20,911	251,363	50,291	119,144	1,272,188
	1928	20,314	281,790	48,714	21,223	1,301,390
Included Above						
Egyptian cotton	1929	20,285	230,979	91,517	34,811	.....
	1928	18,759	217,584	47,352	13,745	.....
Other foreign cotton	1929	7,998	80,034	31,038	20,635	.....
	1928	5,979	81,533	29,654	14,602	.....
Amer.-Egyptian cotton	1929	1,395	16,178	5,756	604	.....
	1928	804	15,137	2,229	1,940	.....
Not Included Above						
Linters	1929	83,570	870,906	156,870	42,634	.....
	1928	70,128	780,229	132,468	38,090	.....

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Rayon Outlook Satisfactory

Increasing Demand From Weavers Brings Optimism

RAYON'S position in the woven fabric field is becoming more important daily. The spokesman for a large yarn producer said this week that the current unfilled orders for rayon woven fabrics represent a big advance over this time last year. One element in sending these figures upward has been the demand for rayon flat crepe, which is an outstanding feature of the fall season in the fabrics trade. Weavers are buying yarns in large quantities, for the production of flat crepes. When rayon flat crepe first appeared, it was made of 100 denier, 40 filament; then the weavers used 150—60 filament; now, however, the bulk of the demand is for 150 denier, 36 filament.

Crepe Yarn Demand Growing

The business from weavers of crepes represents a large part of current turnover, rayon producers report. One factor whose firm is an outstanding unit in the rayon field, said the demand from rayon flat crepe weavers represented about 50% of their weaving business. The call is almost entirely for spot shipment, and producers are having difficulty in meeting the demand. Shortage of various sizes is reported, especially the 150s; one firm complained they could not meet the call for 150-60, and were out of all second quality yarns. Other firms were out of all second quality yarns except the 300s.

There seems to be particular call for 150-24; several producers who are running maximum output on this number, are unable to meet the demand.

The situation is mixed, as regards spot shipments; certain firms flatly decline to promise any deliveries within four weeks; other smaller firms however are accepting spot business. This condition has rather helped the smaller firms, and they are doing an active spot business.

Market Tone Excellent

The tone of the rayon yarn market is perhaps as satisfactory as it has been at any time this year. Manufacturers have regained confidence and buy ahead without hesitancy. There is little heard about prices, the consuming market apparently having decided that prices will remain status quo for a good while. Interest centers—and rightly—on the remarkable gain registered at the broadsilk end; the demand from the weavers is expected to grow steadily to the end of the year. Call from knitters continues, though there is little outstanding at this end. In the half-hose field, the trend seems to be more toward rayon mixtures than toward all-rayon goods. Underwear producers have their eyes on the Christmas season, and are leaning toward the finer filaments in the hope of winning further recognition for rayon merchandise as a Christmas gift proposition. Men's rayon underwear producers have begun to lay more emphasis on the word "rayon" in their promotion, and retailers are cooperating in this direction. During the past few weeks, the word "rayon" was used conspicuously in New York stores, in window cards announcing men's rayon underwear prices.

Domestic Rayon Quotations

(Producers' List Quotations)

Viscose Process

Denier	Filament	First Quality	Second Quality
75	18	$2.35	$1.50
75	30	2.45	1.35
100	18	1.95	1.60
100	40	2.00	1.65
125	18	1.45	1.25
125	36	1.50	1.30
150	24-32	1.15	1.10
150	36	1.20	1.15
150	60	1.35	1.30
150	75	1.50	....
170	24-27	1.15	1.10
170	60	1.35	1.30
200	30	1.10	1.05
200	60	1.30	1.25
300	40-60	1.00	.95
400	72	1.10	.95
450	54	1.00	.95
600	72-96	1.00	.95
900	100-144	1.00	.95

Nitro-Cellulose Process

Denier	First Qual.	Second Qual.	Denier	First Qual.	Second Qual.
35	$3.50	$3.25	125	$1.45	$1.25
50	2.75	2.50	140	1.15	1.10
75	2.35	1.65	150	1.15	1.10
100	1.95	1.60	160	1.15	1.10
			175	1.15	1.10

Cuprammonium Process

Denier	Filament	Price	Denier	Filament	Price
15	25	$4.15	40	30	$3.15
25	25	3.65	52	30	3.00
30	25	3.40			

[Due to diversified offerings prices for higher deniers are not listed.]

Acetate Process

Denier	Price	Denier	Price
45	$3.00	120	$2.30
55	3.00	150	1.90
75	2.55	200	1.90
100	2.40	300	2.20

Rayon Waste

Open bleached waste	$0.36-$0.40
Open unbleached waste	.20-.36
Bleached thread waste (mfrs.)	.20-.25
Colored thread waste	....-.16
Colored clips	....-.16

Converted Rayon Waste

Bleached tops	$0.61-$0.63
Unbleached tops	.57½-.59
Bleached noils	....-.27
Bleached garnets	.38-.45
Unbleached garnets	.32-.34
Colored garnets	.25-.27

duPont Cuts Cone Service Charge to 4c.

Improved Efficiency in Manufacture Permits Reduction—Other Firms Disinclined to Follow

Announcement of a reduction in the differential between skein and cone prices, was made by duPont Rayon Co., on Sept. 18; the revision cuts the service charge for yarns put up in cones from about 7½c. to 4c. Officials of the company said the cut was decided upon because of improved efficiency in manufacture, and added that it had no significance as regards other prices. The prices of skein yarn remain unchanged.

The statement issued by the duPont Co. follows:

"Effective Sept. 19, the duPont Rayon Co. announces a reduction to 4c. per pound in its service charge for putting up on cones viscose process yarns 150 denier and heavier. The prices on yarn remain the same as published on June 17, 1929."

The price list of the company, including the reduction on cones follows:

Denier	No. of Filaments	Skeins 1st	Skeins 2d	Unbl. Cones 1st
75	18	$2.35	$1.65	.....
150	24	1.15	.10	$1.19
150	40	.20	1.15	1.24
170	24	1.15	1.10	1.19
200	30	1.10	1.05	1.14
300	40	1.00	.95	1.04
450	72	1.00	.95	.....
600	96	1.00	.95	.....
900	144	1.00	.95	.....
	Super Extra Yarns			
65	26	.....	.....	2.65
80	30	2.40	1.70	.....
100	40	2.00	1.65	2.10
125	50	1.50	1.30	1.60
150	60	1.35	1.30	1.39
170	60	1.35	1.30	1.36
200	80	1.30	1.25	1.34
	Lolustra Yarns			
150	24	1.20	.....	1.24
150	40	1.25	.....	1.29
300	60	1.15	.....	1.19
	Super Extra Yarns			
100	40	2.05	.....	2.15
125	50	1.55	.....	1.65
150	60	1.40	.....	1.44
200	80	1.35	.....	1.39

Other producers who put up yarn on cones were questioned as to whether they would follow suit, and they replied that they did not expect to. Executives of the Viscose Co., the largest rayon producing company, said they did but a comparatively small cone business, and added that they did not expect to cut the service charge to the new duPont level.

At the time of the Feb. 21 price cut, the differential on cones was cut to 5c. a pound. When prices were again readjusted, the differential on most of the yarns was 7½c. between the price of skein yarn and rayon on cones. The present reduction of cone prices, which leaves the skein prices unchanged, may result in increased use of coned yarn.

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SILK AND SILK YARNS

Recession in Raw Silk Market Starts

Importers Welcome Drop Hoping It Will Bring Revival of Business

THE expected decline in raw silk began to manifest itself this week. Prices were off 5 to 10c.; the drop failed to stimulate buying, and the market continued quiet. It is believed that a further depression is in order, bringing prices down perhaps 15c. lower; no new activity or strength is looked for prior to the second week of October. Raw silk importers are in nowise disturbed by the development, which was awaited philosophically.

The remarkable strength shown by raw silk throughout August, and indeed, throughout the summer, has placed the industry in a satisfactory position. The current weakness is regarded more or less as a good thing. Manufacturers had begun to complain of the pinch on their margin, due to the high prices, and there was a perceptible turn toward rayon as a substitute for silk in the volume production field. Silk importers are not eager to see prices go so high that they will spur weavers or knitters to use more rayon. The importers insist that there is no competition between the natural and the man-made fiber, but nevertheless they were somewhat uncomfortable last week when numerous manufacturers veered away from silk and used the cheaper synthetic yarn instead.

Week Opened Firm

The week opened firm in trading, but each day brought a more perceptible softening. Buying was active for the first few days, and early months were firm. Latterly, the demand fell off; this sent prices downward, and the decline failed to spur buying. At present, manufacturers are playing a waiting game. Very little business is being placed, and the prospects are that a continuation of the lull will depress prices further. Manufacturers generally look for another drop, and are holding up their orders with that in mind.

The official report on the spring crop has just been received in the New York market, and it shows the total crop to be 2% above 1928. This places the crop 6% above estimate, as the estimate was that it would be 4% below last year. The larger outturn is not expected to have any great weakening effect, as the increase had been anticipated. The general situation in New York is very satisfactory. Factors point out that increased consumption will take care of the increase in crop outturn, and they are not worried.

Silk and Silk Yarn Quotations

Thrown Silk

(60 day basis)

Japan organzine, 2 thd. grand XX in skeins	$6.50
Japan organzine, 2 thd sp. crack in skeins	6.35
Japan crepe, 3 thd. grand XX in bobbins	6.65
Japan crepe, 3 thd. sp. crack on bobbins	6.30
Japan crepe, 4 thd. crack on bobbins	6.25
Canton crepe, 3 & 4 thd. ns. 14/16 on bobbins	4.90
Tussah tram, 2 end on cops	2.75
Hosiery tram, 3 thd. Japan XXX	6.95
Hosiery tram, 5 thd. Japan G XX	6.20
Hosiery tram, sp. crack XX	5.95
Hosiery tram, crack XX	5.85
Hosiery tram, XX	5.75

Spun Silk Yarns

Terms: 2% 10, net 60

40/2	$4.35	60/2	$4.65
50/2	4.55	62/1	3.60

Raw Silk

(60 day basis)

Japan filature, grand XX, 13/15	$5.65
Japan filature, sp. crack XX, 13/15	5.50
Japan filature, crack XX, 13/15	5.35
Japan filature, XX, 13/15	5.25
Japan filature, best X, 13/15	5.00
Japan filature, X, 13/15	4.95
Canton filature, new style, 14/16	3.85
Canton filature, new style 20/22	3.50
Tussah filature, 8 cocoon	2.20
Grand XX (Yellow) 20/22	5.25
Grand XX (White) 20/22	5.30
Sp. crack (Yellow) 20/22	5.20
Sp. crack (White) 20/22	5.20
Crack (Yellow) 20/22	5.15
Crack (White) 20/22	5.20

National Raw Silk Exchange

	Close Sept. 11	For the Week High	Low	Close Sept. 17	Net Chg.
September	5.05	5.15	5.05	5.09	+.04
October	5.05	5.14	5.02	5.06	+.01
November	5.06	5.12	5.02	5.05	—.01
December	5.05	5.12	5.02	5.05	...
*January	5.05	5.11	5.00	5.03	—.02
*February	5.04	5.12	5.00	5.03	—.01
*March	5.05	5.12	5.00	5.04	—.01
*April	5.05	5.12	5.00	5.04	—.01

Sept. 11 to Sept. 17—Total contracts 776 (57 old; 719 new); Total number of bales 7,975; total approximate value $5,303,275.

*New 10 bale contract basis.

Thrown Silk Prices Again Advance

High Charges Discourage Manufacturers, and Slow Up Buying, is Complaint

An increase in buyer interest served to firm the thrown silk market, and prices advanced 5 to 10 cts. all along the line. Throwsters said prices were stronger than they had been in some months, and added that this situation was not altogether satisfactory, as manufacturers are reluctant to pay current quotations. One thrown silk factor said he found the rising trend of prices had slowed up his sales, because it narrowed the operating margin of the manufacturer.

Current demand is divided between knitters and weavers. Hosiery manufacturers placed some "feeler" business for trams, mostly for late fall shipment; these knitters as a whole are still playing a waiting game on their winter needs. Broadsilk mills did some buying, though not on a big scale.

There is considerable thrown silk available in the New York market, and though it is not enough to represent a real surplus, it is causing the throwsters some thought. They are hopeful that end-September demand will effect a clearance.

Spun Silk Demand Is Still Hesitant

Sprinkling of Orders Coming from Weavers, But Real Activity is Absent

The spun silk market has not yet begun to register the normal demand for September. The indifferent buying which marked the opening of the month, especially the let-up in orders from woolen and worsted manufacturers, has thrown the month backward, to date, but spinners are hopeful of some early activity. A sprinkling of business was reported in New York this week; it was divided among all the weaving trades. Silk, cotton and woolen and worsted manufacturers placed orders hesitantly. The last-named are still cautious, due to the warm weather of early September, which slowed up the movement of winter fabrics. Cotton and broadsilk mills were more interested, but here too the buying was spotty. Spinners estimated that the business done in the past week was nearly average for this time of the year; it will take considerable additional activity, however, to bring the total month up to scratch.

Broadsilk weavers made numerous inquiries, and showed signs of getting ready for October buying. At present their orders are limited chiefly to yarns needed for the production of samples.

The tone of the spun silk market continues firm, and the situation, despite the current quiet spell is considered satisfactory. The active advance bookings during August, have placed most of the larger mills, in a strong position. Weavers generally are paying more attention to their spun silk fabrics than in other years, and the indications are that, once the real fall buying starts, the market will be active for a considerable period.

Berizzi Named U. S. Agents for Italian Spun Silk Firm

Berizzi Bros. Co., Inc., 95 Madison Ave., New York, have been appointed sole selling agents for the United States and Canada, of the Societa Per La Filature Del Cascami di Seta, of Milan, the largest producers of spun silk (Schappe) in Italy. Their products are used extensively in America. L. B. Scharpf will have charge of this department for Berizzi Bros. Co., Inc.

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WORSTED YARNS

Knitting Trades Buying Briskly

Sweater, Hosiery and Underwear Mills Cover

PHILADELPHIA.

THERE is an active call for worsted yarns from knit goods manufacturers and sweater and sweater-coat manufacturers as well as manufacturers of hosiery and underwear are taking larger quantities than for a number of months. Spinners of outerwear counts in this section have booked a large volume of business within the last two weeks and a majority of them are running on full time schedules for the first time in many months while others, having accumulated stocks through the dull period, are selling actively from stock and plan to operate their machinery more actively in the next week.

Outerwear manufacturers were caught short of yarn this fall and their rush to buy came a little too late for them to take full advantage of the lowest prices although a large number of manufacturers in this section placed substantial contracts when they could buy on the basis of $1.27½ for the best 2-20s quarter blood. Those who have neglected to buy until the last two weeks have paid two and half cent more, their basis being $1.30 for the same count.

Medium Wools Higher

Larger demand from outerwear mills has come just at a time when medium wools were strengthening and the two have made a strong situation in yarns spun from quarter and three-eighths wools with indications the present price will not be lowered and there is a possibility that after spinners sell a volume of yarn at the $1.30 level for 2-20s they will increase their prices more, a majority of them quoting $1.32½ at the present time although they admit not being able to sell in volume as yet at the top quotation.

There is an exceptionally active demand for 2-40s, 64s, for knitting purposes and sales of this count, French spun, have been reported at $1.80 to $1.85, one spinner reporting the sale of 200,000 lbs., at $1.82½ while another reports large volume moved at two and half cents higher. This yarn is going into ladies' knit suits and spinners state a larger amount of it has been sold this season than for several seasons.

For the first time in years spinners of French merino counts used by hosiery and underwear manufacturers report a more active demand, several large buyers having been in the market. During recent years the trend in many instances has been for manufacturers to buy cheaper and lower wool percentage yarns and they showed little interest in French spun merino because of its higher cost. During the last two weeks reports show a noticeable increase in the amount of business of this type placed with spinners.

Men's wear manufacturers are consuming yarn actively in their new season lines but for the time being are not placing important contracts for mixture yarns. Spinners specializing in these qualities state many of them covered their needs for the next few weeks last June and until such contracts have been filled they do not look for additional business although they report manufacturers are specifying actively on such orders, showing they are finding a good response to their new goods.

While the yarn market is firmer and more active than last month it is apparent strength shown in medium grade yarns has not yet been transmitted to fine, it being possible, for example, to sell 2-40s, 64s, for knitting purposes, French spun, at $1.85 while 2-50s fine for weaving has been reported sold low as $1.80 in Bradford spun. One of the largest spinners reduced prices on fine counts early this week while their prices on quarter blood were either strong or being advanced. Sales of 50s French spun have been reported low as $2.10. Fine yarns are following the trend in wools, fine grades being sluggish while advances have been registered in quarter and three-eighths.

Worsted Yarn Quotations

(Corrected Close of Business Wednesday)

Bradford System

2-12s, low, com. (36s)	$1.00 -$1.05
2-16s, low com. (36-40s)	1.05 - 1.10
2-20s to 2-24s, low ¼ (44s)	1.15 - 1.20
2-20s to 2-26s, ¼ bld. (46-48s)	1.25 - 1.30
2-26s to 2-30s, ¼ bld. (48s)	1.30 - 1.35
2-30s to 2-32s, ¼ bld. S. A. (46s)	1.40 - 1.45
2-32s, ¼ bld. (48-50s)	1.45 - 1.47½
2-20s, ½ bld. (56s)	1.45 - 1.50
2-26s, ½ bld. (56s)	1.50 - 1.55
2-36s, ½ bld. (56s)	1.60 - 1.65
2-32s, ¾ bld. (60s)	1.65 - 1.70
2-36s, ¾ bld. (60s)	1.70 - 1.75
2-40s, ¾ bld. (60s)	1.75 - 1.80
2-50s, high ¾ bld. (64s)	1.85 - 1.90
2-50s, fine, (66—70s)	1.95 - 1.97½
2-60s, fine, (70s)	2.30 - 2.35

French System

20s, high, ¼ bld. (50s)	$1.45 -$1.50
20s, ½ bld. (56s)	1.47½- 1.52½
26s, ½ bld. (56s)	1.52½- 1.57½
30s, ¾ bld. (60s)	1.65 - 1.70
50s, fine warp (66-70s)	1.75 - 1.80
40s, ¾ bld. (60-64s)	1.77½- 1.82½
50s, (66-70s)	1.92½- 1.95
60s, (70s)	2.27½- 2.30

Knitting Yarns in Oil (Bradford)

2-20s, low, ½ bld (44s)	$1.10 -$1.15
2-18s to 2-20s, ¼ bld. (50s)	1.30 - 1.32½
2-26s, ¼ bld. (50s)	1.36 - 1.38½
2-30s, ¼ bld. (50s)	1.40 - 1.42½
2-20s, ½ bld. (56s)	$1.45
2-20s, ¾ bld. (60s)	1.60 - 1.65

French Spun Merino White

30s, 50-50.. $1.27½-1.30 30s, 70-30.. $1.47½-$1.50
30s, 60-40.. 1.37½-1.40 30s, 80-20.. 1.57½- 1.60

Top and Noil Quotations

Tops—Boston

Fine (64-66s)	$1.20-$1.22
Half-blood (60-62s)	1.18- 1.20
High ¾ blood (58s)	1.12- 1.15
Aver. ¾ blood (56s)	1.07- 1.10
Low ¾ blood	1.02- 1.05
High ½ blood (50s)	.97- 1.00
48s N. Z.	.95- .98
46s S. A. and N. Z.	.93- .95
44s S. A. and N. Z.	.85- .87
40s S. A. and N. Z.	.83- .85
36s S. A. and N. Z.	.82- .83

Noils—Boston

Fine	$0.73-$0.78	Low ¾ bld.	$0.58-$0.60
Half-bld.	.70- .73	High ½ bld.	.55- .58
High ¾ bld.	.68- .70	46s	.53- 55
Aver. ¾ bld.	.60- .63	44s	.50- .53

Tops—Bradford, Eng. (Sept. 14)

Fine (70s)	40d	¾ bld (56s)	28d
Fine (64s)	37d	½ bld (50s)	24½d
¾ bld. (60s)	34d	Cross-bred (46s)	21½d
¾ bld. low (58s)	32d		

Top Consumption On High Level

New Business Restricted—Bradford Market Nervous—Noil Situation Unsatisfactory

BOSTON.—The top market, so far as new business is concerned, is quite sluggish but the industry seems to be well supplied with orders on the books while mills that do their own combing are recorded as very busy. Quotations seem to be on a steady basis, no indications of any rise nor on the other hand of any decline so long as the wool market continues firm. A possible weak spot in the wool market which, however, as not yet developed, is in the merino section which is a little nervous over the proposition of moving the immense Australian clip without any lowering of values. The Bradford market continues nervous although 64s has not fallen below 37 pence.

Movement outward to the mills is very restricted in volume and consumers still manifest a bearish attitude on merino noil prices. The local market is short of business and there is an air of uncertainty hanging over the situation. Merino noils are moderately firm considering the large output, but at 70-75c. are said to be stabilizing. Around the middle of 1922, before the tariff bill went into effect, fine noils were 65c. and fine wools $1.03, the noils being 63% of the quoted price of the wool. At this time fine noils are around 73c. and fine wool at 93c., the noil value being 78% of the wool value. There is evidently still room for further easiness in fine noils and in some manufacturing quarters a further decline is desired and expected.

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WOOL AND SUBSTITUTES

Higher Duty Favorable to Rags

May Do for Rag Graders What 31c. Has Done for Wool Growers

BOSTON.

THE reworked wool and old woolen rag markets meet rather slow business, there being no indications of any increased mill interest at the moment, although some development in buying is anticipated for the near future. Prices are steady with mixed rags very firm on a level not altogether favorable to graders.

Statistics available regarding the relation of mixed rags to wool seem to indicate that these raw materials of the grading industry are relatively higher than wool. Comparison of mixed rag values and wool values, taking average prices for 1926 as the base figures equalling 100 and relating the same to average values at this time give the following:

	Mixed Rags	Wool (Ohio Medium)
1926	100	100
1929, Sept.	112	100

Several of the important graded rags are selling well below their normal prices as determined by the cost to the grader of his mixed stocks. The price obtainable for a graded rag as related to the price paid for the mixed rag is an all-important proposition to the rag grader who wishes to stay in business and do a fairly profitable business.

It is rather surprising that American operators seem so languid in the foreign rag markets. The natural presumption would be that desirable colored knits, white underwear and hosiery clips and similar materials would be imported into bond in growing volume; but there has been but little evidence of any such transactions.

The possibility of a strong tariff on rags ought to prove a steady bullish factor in the old domestic rag market. If imports are cut off, or greatly diminished, nothing in the world except a complete collapse of woolen manufacturing can prevent the domestic rag market from rising to a higher level of prices.

The American section of the Dewsbury market is positively quiet and very little stuff is being shipped. If there were any reason to believe that the proposed high duty on rags would come into operation in the near future it could be taken for granted, so it is stated, that the English agents of American rag firms would be buying already considerable quantities in order to get the material across the water before the new tariff became operative.

In the Dewsbury market it is said that the new American tariff proposals seem to be having stormy passage but amid much that is doubtful one point stands out as clearly as the Statue of Liberty—there is going to be a duty on woolen rags which will render their importation semi-prohibitive. The American tariff is certainly productive of much uncertainty in the Dewsbury district and the market in American style rags is in a condition of suspended animation. It is generally agreed that a 24c. duty would be a complete embargo.

Wool Quotations

Ohio, Pennsylvania and West Virginia			
Fine delne..	$0.38 -$0.39	¼ blood...	$0.44 -$0.45
Fine clthg...	.32 - .33	½ blood...	.43 - .44
¼ blood.....	.44 - .45		
Texas and California			
Texas, 12 months			$0.90 -$0.92
California, Northern			.85 - .87
Pulled—Eastern (Scoured Basis)			
A.A.....	$1.00–$1.03	B-Super...	$0.83–$0.87
A-Super....	.93– .95	C-Super...	.78– .80
Montana, Idaho and Wyoming (Scoured Basis)			
Staple fine			$0.93–$0.95
Staple fine ¼ bld.			.93– .95
Fine and fine medium			.90– .92
¼ blood			.90– .92
½ blood			.80– .82
Mohair—Domestic			
Best carding			$0.48–$0.50
Best combing			.65– .68
Mohair Foreign (In Bond)			
Turkey fair, average			$0.41–$0.43
Cape firsts			.43– .45
Foreign Clothing and Combing (In Bond)			
Australian:		Montevideo:	
70s.....	$0.88–$0.90	58-60s....	$0.40–$0.41
64s.....	.75– .78	56s.....	.40– .41
58s-60s....	.70– .73	50s.....	.37– .38
Buenos Aires:			
4s, 40–44s			$0.31–$0.32
5s, 36–40s			.29– .30
Foreign Carpet (Grease Basis in Bond)			
China: Combing No. 1			$0.28 –$0.29
China Filling Fleece			.25 – .26
Szechuen ass't			.27 – .28
Cordova			.25½– .26
Scotch black face			.27 – .28
East India: Kandahar			.36 – .38
Vican'r			.41 – .43
Joria			.41 – .43
Aleppo			.38 – .39

Substitute Quotations

Wool Waste	
Lap—Fine white	$1.02 –$1.05
Fine colored	.90 – .93
Thread White Worsted—Fine	.81 – .83
¼ blood	.58 – .60
Thread Colored Worsted—Fine two-ply	.48 – .50
¼ blood, two-ply	.30 – .33
Card—Fine White	.50 – .53
Medium white	.31 – .33
Old Woolen Rags (Graded for Mfrs.)	
Merinos—Coarse light	$0.07½–$0.08½
Fine dark	.06 – .06½
Fine light	.19 – .20
Serges—Blue	.10½– .11
Black	.09 – .10
Red	.14 – .15
Knit—White	.42 – .43
Red	.20 – .21½
Light hoods	.20 – .21
Worsteds—Light	.07 – .07
Blue	.11 – .12
Black	.10 – .11

Medium Wool Stocks Hold Very Steadily

Fine Wools Fairly Stable But Prospects Affected by World Situation

BOSTON.—Quotations on standard wools in the Summer Street market show little if any change from a week ago and where any change has occurred it has been on the up side. Domestic wools of the qualities in demand, chiefly medium wools and fine French combing qualities are holding very firm with a rising tendency seen in the medium wools. Nothing has yet happened to impair the rather stable situation that has developed in fine wools although it is admitted that there is an adequate supply of these types at the present time.

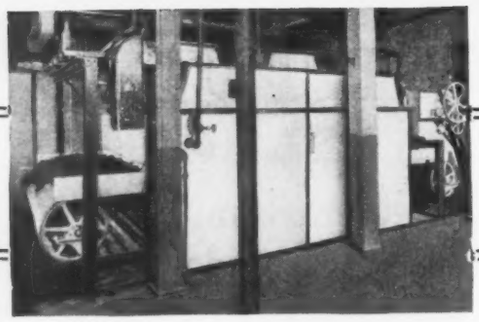
Holders of domestic and foreign wools have been slightly encouraged by the steady opening of the Australian season. There is of course an immense amount of wool to be offered in Australia before the year closes and there is still opportunity for a lower level of values to be seen but the purchasing by the Continent and Bradford has been on a good-sized scale. The prospect for the lifting of the Australian clip without any slump in values seems distinctly more promising. So far as the U. S. is concerned it has to be noted that since the tariff now in force went into effect consumption of foreign wools for clothing purposes have shown a considerable decline, their place being taken by increased supplies from the domestic wool field.

Volume of business is on a smaller scale than in July and August. Many mills are apparently well bought up to cover their immediate needs and their further purchasing will depend upon a development of interest in the New York goods market. Prices are very firm on the three-eighths and quarter-blood domestic qualities.

Boston Wool Receipts

Receipts of domestic and foreign wools at Boston, also imports at Philadelphia and New York for the week ending Sept. 14, based upon data compiled by the Market News Service of Bureau of Agricultural Economics, Department of Agriculture, are as follows:

	Week Ended Sept. 14	1929	1928
Domestic.....	10,855,000	184,162,000	186,900,000
Foreign.....	1,043,000	80,450,000	74,644,000
Total.....	11,898,000	264,612,000	261,544,000
IMPORTS AT PRINCIPAL PORTS			
Boston.....	1,043,000	80,450,000	74,644,000
Philadelphia...	1,797,000	66,608,000	51,140,000
New York....	1,569,000	52,871,000	46,743,000
Total.....	4,409,000	199,929,000	172,527,000



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DYEING AND FINISHING

Large Addition to Union Bleachery

Plans for an extensive addition to the Union Bleachery, Greenville, S. C., to be located adjacent to the present plant and to measure approximately 450 x 100 ft., have been announced. The general contract has been awarded to Potter & Shackelford, Inc., of Greenville, and construction is to begin within a few days.

Several months ago an announcement was made to the effect that Union Bleachery would build a print works alongside the present plant. However, these plans were held up and finally abandoned. The new addition, for which plans have been prepared by J. E. Sirrine & Co., engineers, of Greenville, do not include a print works, but will provide space for expansion of finishing operations on a larger scale.

It was estimated that six months will be required in which to complete the building and that additional time will be necessary for the installation of machinery. Officials of the company also recently announced the purchase of an extraction type steam turbine unit, which will be installed within the next few months. Estimated cost of the proposed addition and new power equipment was placed at $350,000.

E. G. Robinson Heads du Pont Dyestuffs Dept.

E. G. Robinson has been named general manager of the dyestuffs department of E. I. du Pont de Nemours & Co. succeeding W. F. Harrington, who was recently elected a member of the executive committee. Mr. Robinson has been assistant general manager of the dyestuffs department and has had long experience with the du Pont company.

He is a graduate of Swarthmore College, 1905, where he majored in chemistry. He joined the du Pont company the same year as a chemist at the Eastern Laboratory. Cesare Protto has been appointed assistant general manager of the dyestuffs department to succeed Mr. Robinson. He is a graduate of the Scuola Professionale of Biella, Italy.

Stauffer Chemical Co. Starts Operation of Roanoke Plant

ROANOKE, VA.—The plant of the Stauffer Chemical Co., which was completed here recently at a cost of approximately $250,000, has commenced operations manufacturing carbon bisulphide, a chemical that is used in the silk and rayon manufacturing industry. As soon as the plant gets in full operation it will produce about 20 tons daily.

Starches and Stiffness

Comparison of Effects of Wheat, Rice, Corn and Potato Starches

A study of the stiffness in fabrics produced by different starches and starch mixtures is reported by Esther C. Peterson, assistant chemist of the Bureau of Home Economics, in Technical Bulletin No. 108 of the U. S. Department of Agriculture. A machine was devised for measuring the stiffness of materials and the abilities of wheat, rice, corn, and potato starches to produce stiffness in a cotton fabric. This machine was described in the New Machinery and Processes Section of TEXTILE WORLD, Sept. 7, 1929. In the bulletin Miss Peterson describes the methods employed for preparing the starches and starch pastes and sizing the fabric.

"Different varieties of starch," she writes, "may show different stiffening properties. In general, considering wheat, rice, corn, and potato, the wheat produced the stiffest fabric and the potato the least stiff, whereas the corn and rice gave practically the same effect. The same species of starch from different sources may exhibit different stiffening properties. Three different stiffness values were obtained for the four samples of corn starch secured from different sources. Varying the time of heating the starch paste from 5 to 60 min. had no appreciable effect on the stiffness of the sized fabric when measured by the methods employed in this laboratory.

"Preliminary studies were also made to determine what effect concentration and the addition of foreign substances had on the stiffening action of starch paste. The experiments tended to show that a dilution of the standard paste produced a gradual decrease in the resulting stiffness of the fabrics sized with wheat, rice, and corn starches. In the case of potato starch, it was necessary to reduce the concentration approximately 17% of the original (3.7 to 3.06%) before any decrease in the fabric stiffness became apparent. An explanation based on the extremely viscous character of the potato-starch paste seems plausible.

"The addition of borax increased the stiffening power of corn starch until a maximum of 20% compared to the weight of the starch had been reached, when a decrease in the stiffening power resulted. Salt, paraffin, beeswax, and hydrogenated vegetable oil up to 27% of the weight of starch did not appreciably affect the stiffness of fabrics sized with corn starch."

United States Finishing Co., Norwich, Conn., has filed notice of change in capital to $3,600,000 and 200,000 shares of stock, no par value.

du Pont Atlantic City Display Stresses Fastness of Domestic Dyes

A series of four displays emphasizing the fastness of du Pont dyes has been a feature of the Du Pont Products Exhibit at Atlantic City during the late summer and early fall. The large windows of the exhibit facing on the boardwalk were attractively dressed in a manner to stress this idea, and the display drew great attention. One showing included sheets and pillow cases manufactured by the Utica Steam & Mohawk Valley Cotton Mills of Utica, N. Y. An exhibit of du Pont dyed damask tablecloths manufactured by the Halifax Cotton Mills, Inc., of South Boston, Va., was another feature which won public notice.

The display now on view shows fast colors as used by the Leaksville Woolen Mills of Charlotte, N. C., in their Lucerne (part wool) and Rockingham (all wool) blankets.

BUSINESS NEWS

Important Merger of Bobbin and Shuttle Manufacturing Interests

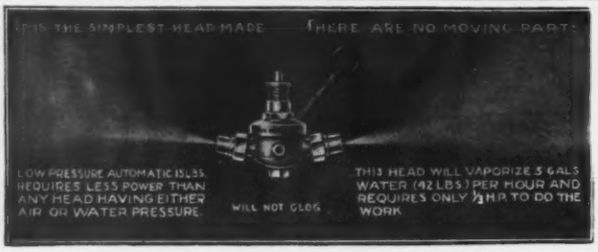
The U. S. Bobbin and Shuttle Co. has added to its interests and resources the business and organization of the Jordan Mfg. Co. The completed merger has recently been announced through Luther C. Baldwin, president of the U. S. Bobbin and Shuttle Company.

By this merger the Jordan Mfg. Co. becomes the Jordan Division of the U. S. Bobbin and Shuttle Co., with headquarters at Monticello, Georgia. Charles H. Jordan will continue as the head of the Jordan Division, and will be a vice-president and a director of the company.

That the Jordan and U. S. factories have been brought under one centralized control affords a broader service to the textile industry of the South. The acquisition of the Jordan interests enables the U. S. Bobbin and Shuttle Co. to meet the increasing demand for U. S. bobbins, spools, and shuttles, through a system of southern factories in Greenville, S. C.; Johnson City, Tenn.; Dublin and Monticello, Ga.; and in the East through Goffstown and Manchester, N. H.; and Lawrence and Lowell, Mass., as well as through its plants in Vermont.

The Jordan Division will be managed by the Jordan personnel with Leland K. Jordan, sales manager, located at Monticello, Ga. A. D. Roper, now in charge in the Johnson City plant of the Jordan Mfg. Co., becomes general superintendent of the Jordan Division. Mr. Roper will have responsibility for all manufacture in the plants at Greenville, Johnson City, Monticello and Dublin.

Dana R. Crawford continues as sales manager in the Eastern Division with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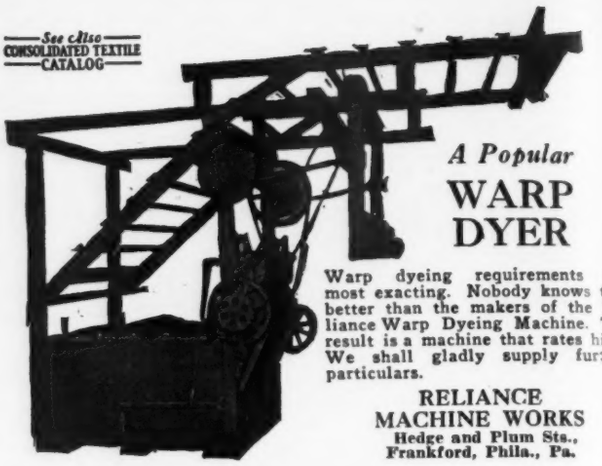

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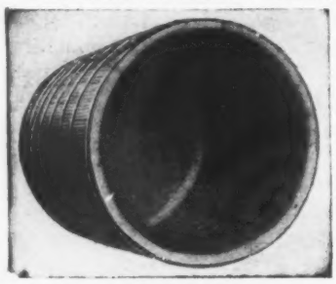

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Southern Wood Preserving Co.
Atlanta, Ga.

headquarters in Providence, R. I. General Superintendent E. C. Buffington will remain in charge of all eastern operations in the plants at Goffstown, Manchester, Lawrence, Lowell and in Vermont.

Morrison Machine Co. Now in New Quarters

The Morrison Machine Co., Paterson, N. J., manufacturer of textile dyeing, finishing and printing machinery and also of patent speed reducing transmissions, is now located in its new quarters at Madison and Getty Aves., Paterson. This plant was formerly the Cooke Shops of the American Locomotive Works and was acquired by Morrison late last year as reported in TEXTILE WORLD for Dec. 22, 1928.

The plant has a 750 ft. frontage on Madison Avenue, which extends from Getty Avenue to the Erie Railroad, with approximately 200 ft. frontage on Getty Avenue. The administrative building is entirely separate from the manufacturing buildings and is a large, commodious, two-story brick structure. The main lobby is tiled in marble, with attractively equipped rail partitions, with chrome-nickel trimmings. There are large, commodious general offices, with a large officers' and directors' room, fitted with fine equipment of mahogany furniture. The entire second floor is devoted to engineering department, drafting room, blue print room, with a private engineer's office.

The main machine shop is 123x507 ft. and is served by three 10-ton traveling cranes. It is furnished with the most modern type of machine producing equipment. There is also an annex building, 42x490 ft. The shop is equipped with toilets and wash room for the workmen. Everything conducive to prompt execution of the work at hand has been installed. A commodious storehouse is kept well stocked for the convenience of customers.

The Morrison Machine Co. was organized in 1908 by James L. Morrision, who is now secretary and treasurer of the company. Mr. Morrison started his business career about 34 years ago as a machinist in the Cooke Shops which his company now occupies. The company's dyeing and finishing machinery is well known in the trade. The patented speed reducers have become an important phase of the business and the output is increasing.

Appointed Assistant General Manager of Hyatt Roller Bearing Co.

H. J. Forsythe, president and general manager of the Hyatt Roller Bearing Co., Newark, N. J., has announced the appointment of H.O.K. Meister as assistant general manager, effective Sept. 1. Mr. Meister has served as assistant general sales manager and later as general sales manager of the Hyatt company at Newark since 1925. Prior to that he was manager of their western division in Chicago. He has been associated with Hyatt for over 15 years.

Wagner Opens Texas Office at Dallas

Wagner Electric Corp., St. Louis, announces the opening of a new branch sales office at 734 Allen Bldg., Dallas, Texas, to cover the entire State of Texas, and parts of Louisiana and Arkansas. Alfred B. Emrick has been placed in charge as manager. Mr. Emrick graduated from the Pennsylvania State College in 1913, spent two years with General Electric, and then joined Wagnor Electric in 1915. He was a salesman in Detroit and Toledo districts until 1921, and then went into business for himself until 1926 at which time he rejoined Wagner. Early in 1927 he was appointed branch manager of the Pittsburgh office, whence he was transferred on Sept. 1, 1929 to take charge of the newly established Dallas sales office.

Torrington Adds to Southern Sales Force

The increasing business of the Torrington Co. in the south-eastern territory is reflected in the announcement that John G. Thacker has been added to the sales force. This support will enable H. D. Blake, jr. to maintain Torrington standards of service to the mills of North Carolina and Tennessee.

Linde Oxygen Plant in Erie, Pa.

A new Linde oxygen plant located at 1628 Cascade Street, Erie, Pa., commenced operations Aug. 21. This plant will supply the local demand for oxygen, widely used for oxy-acetylene welding and cutting.

J. J. McKeen is superintendent of this plant and R. S. Hamilton, whose headquarters are at the East Buffalo Linde plant, is district superintendent.

Diamond Chain Completes New Buildings

The plant extension and the erection of a new office building of the Diamond Chain & Mfg. Co. of Indianapolis, have been completed. The four-story office and administration building is of modern design and concrete fireproof construction. This building fronts on West St. and besides the offices which occupy the entire top floor, also houses the engineering and drafting departments on the third floor. The two lower floors are used for factory extension while the space formerly occupied by office, engineering and drafting departments, also has been converted to manufacturing. A new story and a half addition is used for steel storage. Increased demand for Diamond roller chain made the added 40,000 sq.ft. of factory capacity and manufacturing facilities necessary.

Changes in Link-Belt Personnel

From the executive offices of the Link-Belt Co. comes the announcement of the resignation of F. B. Caldwell, vice-president of the Chicago plant, on account of health.

W. C. Carter, formerly vice-president in general charge of production at all Link-Belt plants, will assume the duties of vice-president and general manager of the Chicago plant.

E. J. Burnell, who was manager of the Pittsburgh office, has been appointed sales manager of the western division, with headquarters at the Chicago plant.

Nels Davis, from the Chicago engineering sales force succeeds Mr. Burnell as manager of Link-Belt's Pittsburgh office.

Davis Mills, Fall River, Mass., have passed up the quarterly dividend for the first time in 25 years, giving as a reason that the business does not warrant payment of a dividend at this time, according to a statement issued.

OBITUARY

Abraham Landow

Following an operation for appendicitis from which he failed to rally, Abraham Landow, aged 37, secretary of the Stitchbound Hosiery Mills, Inc., Reading, died in a hospital. He was a native of Philadelphia and served on the fighting front in France in the World War.

Frank Bradford Mott

Frank Bradford Mott, prominent figure in the asbestos industry and president of the Asbestos Mining & Mfg. Co., Providence, R. I., died at his home at Newport, R. I., on Sept. 6, following an illness of heart trouble, aged 85 years. The asbestos concern has extensive connections in several localities in Canada.

Thomas Kingsley

Thomas Kingsley, for 20 years superintendent of the carding department at the Lippitt Mill at Woonsocket, R. I., died at his home, 78 Park Place, Woonsocket, on Sept. 12, following an illness of heart disease and ailments incident to old age. He was in his 85th year.

Harry Greaves

Harry Greaves, aged 53, superintendent of the worsted and filling mills of the Bigelow-Hartford Carpet Co. at Thompsonville, Conn., died in Mercy Hospital, Springfield, Mass., Sept. 12, of heart disease. He was born in Bradford, Eng., in 1874.

Patrick H. Kelly

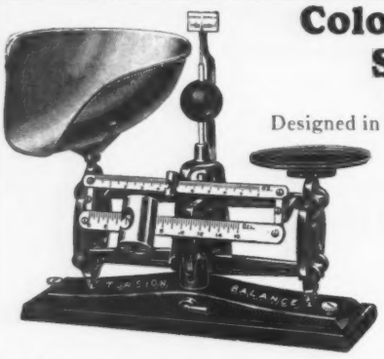
Patrick H. Kelly, senior member of the Kelly & Lampe, Philadelphia, died Sept. 11, at his home in Roxborough. He was 68 years old having been born in Ireland in 1861. Mr. Kelly came to this country when 11 years of age. He was one of the founders of the spinning concern of which he was a member, and as manager became well known to a large number in the trade.

William Stanley Horton

William Stanley Horton, for many years superintendent of the Queen Dyeing Co. in Providence, R. I., died at his home, 330 Lloyd Avenue, Providence, on Sept. 4, following an illness of heart trouble, aged 64 years. He had retired in 1911 from the dyeing business, which was founded by his father, Albert Horton. The plant was later sold to the United States Finishing Co. Mr. Horton is survived by his widow and two brothers.

J. H. Shropshire—J. P. Southern

J. H. Shropshire, aged 35, assistant foreman of weaving at the Lily Mills, Spray, N. C., and for 20 years active in the textile industry there, was drowned recently when his automobile plunged into a canal. He was stricken with a heart attack and lost control of the car. J. P. Southern, night watchman at the Morehead Cotton Mills, nearby, saw the accident and lost his life in an attempt at rescue. The bodies of both men were recovered. Southern was 45 years old and had been an employee of the Morehead mills for 18 years.



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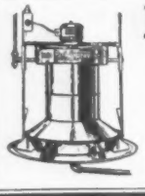

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Textile World

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FIFTH ANNUAL RAYON NUMBER

(Covering Rayon and Other Synthetic Fibers)

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RAYON Convalesces from More "Gro wi

U. S. Output for This Year Estima te

By Douglas G.
Managing Editor,

THE rayon industry has been having its troubles this year. It has felt the effects of increased competition from new units entering production. This has been true not only in this country but throughout the world.

However, the significant point is that these troubles have been recognized as "growing pains" not only by rayon producers themselves but by the majority of men identified with the rayon consuming trades and with retail distribution of rayon material. Not so long ago, the fact that two price cuts were necessary within six months would have been accepted as ample ammunition by the many rayon "bears" who have been predicting intermittently the collapse of the rayon "bubble." This year, however, there was little disposition in any part of the trade to regard the overproduction and resultant price reductions as anything but a temporary problem such as all new industries have to face. In other words, conviction of the stability of the synthetic fiber movement is now firmly rooted. Very few men in the textile industry still harbor doubts as to the inevitable expansion of the use of rayon and allied fibers.

Domestic Production Grows

That such confidence is justified, is borne out by the way in which the rayon industry weathered the storm of the first six months of this year. Things looked pretty black, and the unfortunate combination of a price cut in February followed by another in June—with the resultant market instability—made the situation much worse. Nevertheless, the industry has manifested a resiliency which is remarkable under the circumstances. After the June cut, a new spirit developed and the present outlook is that rayon will close the year with another noteworthy twelve months' period of progress to add to its record.

Certainly, from the production standpoint, the industry has gone ahead without abatement. TEXTILE WORLD's estimate of domestic rayon production, as shown by companies in Table I, indicates that total output for 1929 should be over 131,000,000 lbs., or nearly 6,000,000 lbs. more than the estimate made in these columns at the beginning of the year. The figure given in Table I is based on the actual production for the first seven months of this year, taken in conjunction with the planned production for the remaining five months.

TABLE I—TEXTILE WORLD'S ESTIMATE OF DOMESTIC RAYON PRODUCTION

	Total 1928 Lbs.	1st 7 Mos. 1929 Lbs.	Total 1929 Lbs.	Total 1930 Lbs.
Viscose Co.	54,000,000	38,500,000	66,000,000	80,000,000
DuPont Rayon Co.	18,231,000	13,500,000	25,100,000	28,000,000
Tubize Artificial Silk Co.	8,500,000	6,000,000	11,000,000	12,000,000
Celanese Corp.	5,000,000	4,000,000	7,000,000	8,000,000
Industrial Rayon Corp.	4,250,000	3,750,000	6,500,000	11,000,000
American Bemberg Corp.	2,100,000	1,750,000	2,300,000	4,000,000
American Glanzstoff Corp.	350,000	1,325,000	3,575,000	8,000,000
American Enka Corp.		10,000	1,000,000	4,500,000
American Chatillon Corp.			1,500,000	6,200,000
Skenandoa Rayon Corp.	1,150,000	770,000	1,350,000	3,250,000
Delaware Rayon Co.	1,500,000	1,200,000	2,000,000	2,000,000
New Bedford Rayon Co.		100,000	400,000	2,000,000
Belamose Corp.	1,380,000	1,000,000	1,700,000	1,700,000
Acme Rayon Corp.	740,250	475,000	900,000	1,000,000
Other firms	500,000	500,000	1,000,000	2,000,000
	97,701,250	72,880,000	131,325,000	173,650,000

"Growing Pains"...

...estimated at 131,325,000 lb.

Woolf
TEXTILE WORLD

Rayon and Other Synthetic Fibers

In many articles throughout this issue, the term "rayon" will be used when it is really meant to include other synthetic fibers, the producers of which do not use this term. The reason for such use is apparent. Constant repetition of the term, "rayon and other synthetic fibers" would detract from the clarity and readability of the articles.

It will be noted that, on the cover of this issue, there is a phrase explaining that it surveys the entire field of synthetic fibers and this thought should be kept in mind in connection with all statements as to the progress and use of rayon, unless some specific type is mentioned.

It should be emphasized in this connection however that it is more difficult to arrive at absolutely accurate estimates of rayon production now than it was a few years ago. As new firms continually enter the picture, with comparatively uncertain outlook as to the actual amount of commercial production in the near future, compilation of statistics becomes more and more of a real job. Furthermore, the increasing emphasis being placed on fine sizes creates the problem as to just what deniers a plant will be producing during any future period. For example, it may be operating at full capacity but, if a decidedly larger proportion of its output becomes fine size rayon, the poundage produced will be relatively smaller.

Consequently estimates such as those given in Table I must be regarded more as guides to the statistical position rather than as figures which are correct within a million pounds.

Nor is it possible to predict with any assurance the extent to which this 131,000,000 lbs. will be absorbed by the consuming trade. If progress continues as it is developing at present, there should be no large volume of stocks at the end of the year. Naturally however this statement can be entirely upset by any recurrence of instability such as developed during the first half of the year.

Record Imports Probable

Not only is production of rayon and other synthetic fibers setting a new high record for this year, but imports from other countries have been on a level, thus far in 1929, unequalled previously. If such importation continues during the remainder of the year at the same monthly average as was in effect during the first seven months, the total for the year will be 17,285,580 lbs. Naturally this is more of a mere estimate than is production because the cut in domestic prices which went into effect in June slowed up importations and it is possible that the remaining months will not show anything like the rate manifested in the first part of the year. The total for the first six months was 9,225,655 lbs. On this basis the total for the year would theoretically be nearly 18,500,000 lbs. However in July, imports fell to 857,600 lbs. as compared with 1,581,832 lbs. in June and also as compared with an average monthly importation during the first half of the current year of 1,537,609 lbs.

Assuming that the estimate of 131,325,000 lbs. is correct for this year's domestic rayon production and that the estimate of 17,285,580 lbs. for this year's rayon importation is also accurate, this means an apparent consumption of 148,610,580 lbs. This figure is eloquent when it is considered in comparison with the total consumption in 1924, only five years ago, comprising 38,850,000 lbs. of domestic production and 1,711,987 lbs. of imports or a total of 40,561,987 lbs. In other words the consumption today is three and one-half times that of five years ago—and it must be remembered that in 1924 a great many people believed that the synthetic fiber industry had reached the top and that the future held little expansion, and possibly contraction, of the use of this fiber.

The Price Situation

The upward scale noted in both rayon production and rayon importation has not applied to prices. On the contrary, there have been two price cuts since the first of the year, one late in February, and the other in June. Taking the standard grade of 150 denier, first quality, as an example, the February cut meant a reduction of 20c. on this count while the June cut meant a further reduction of 15c. In other words 150 denier, first quality, which was selling at $1.50 at the beginning of the year, is now quoted at $1.15—representing approximately a 23 per cent reduction during that period.

All sorts of explanations have been advanced during the year for this price weakness. In addition, there has not been unanimity among producers as to the necessity for such price action.

The writer regards the reductions, and the market situation which lead to them, as one of those temporary "gaps" in the development of a new industry—to which he has referred in these columns so many times before. He sees in this market phase no indication of a fundamental change in the progress of synthetic fibers. In fact, the improvements made in the strength and appearance of all yarns on the market during the year mean far more on the positive side of the outlook than does any temporary price weakness mean on the negative side.

Nevertheless, in his opinion, rayon producers have a lot to learn from the experience in the first half of this

year. Manufacturing a fiber which had, as one of its chief selling points, price stability, they have permitted this vital asset to disappear. Admitting that it is very easy to draw a lesson from past events and not so easy to shape those events for the future in the best way, the writer nevertheless feels that one of the great problems facing rayon mnaufacturers today is the development of methods by which as stable a price situation as possible can be assured in their product over the future. This is no soft job but it is one that has to be done. Rayon must keep out of the class of cotton, wool, silk and other natural fibers which fluctuate as the result of influences beyond the control of man. Rayon *is* under man's control and it should be kept there—not only in its technical development but in its marketing.

A basic thought in this connection is one which the writer has discussed before—namely, that the price of synthetic fibers must inevitably tend downward rather than upward over the broad future—due to increased manufacturing efficiency and larger-scale production. This comparison refers merely to any particular type of rayon. It does not mean that special yarns will not be developed from time to time possessing special characteristics which will enable them to be sold at a premium over the general market.

But granted that, in general, the broad trend will be downward, it is up to the producers to anticipate the necessity for price cuts rather than to wait until they are forced upon them by market weakness. Sudden announcements of reductions always have resulted and always will result in market instability and disorganization, with a reaction against the synthetic fibers among their consumers.

Opinions from the Trade

The pages of this special issue detail the many noteworthy developments which have been made recently in the synthetic field. Consequently it is not necessary for the writer to indicate them here.

It is helpful, however, to augment his own opinion with those men in active touch with the trade both here and abroad. A few such expressions follow:

L. A. Yerkes, president, Du Pont Rayon Co: "We believe the general status of the rayon market at the present time is good. The recent price reduction has, we hope, stabilized the market, giving confidence to everyone. Consumption is running well ahead of last year and in spite of the new production which has come in and which is due to come in later this year, there are no excessive stocks. We look for further increases in consumption for the balance of this year, believing as we do that the price level has reached the point of stability."

* * *

G. O. Hamlin, The Viscose Co.: "We feel that the demand is going to continue good and possibly increase due to the recent price reductions which make possible its use in fabrics for which it had not been used previously."

* * *

L. H. Ryan, general manager, Delaware Rayon Co., New Castle, Del.: "With the tariff question practically settled, the rayon industry is in a position to aid in the development of many uses for the material which will not only take care of the present production but present a bright outlook for future expansion. The reductions in prices this year have resulted in an increased consumption of yarn and a healthy condition in the rayon business. It is now absolutely necessary for the producers of quality yarn to furnish the consumers with a product that has been carefully manufactured and inspected to meet a critical demand."

* * *

Hubert D. Kernan, vice-president and treasurer, Skenandoa Rayon Corp.: "Rayon business at present is very good and we see no reason for its not continuing so for the balance of the year. In general, of course, we expect an expanding market in rayon on account of the better quality of the product and the new uses to which it can be put with this improvement."

* * *

Beveridge C. Dunlop, vice-president, American Glanzstoff Corp.: "I am not one of those who are fearful of the rayon industry as to me the coming years are bright with promise. There is no question in the world that the present prices of rayon are such that the consumption is bound to expand many times beyond its present volume. It is perfectly true that there is keen competition in some of the rayon fabrics, knitted and woven, but that has always been the case in every industry on any particular line of merchandise which is simple to make and lends itself to mass production. We need more style effort in fashioning garments and creative genius in designing new fabrics, either of all rayon or in combination with wool, silk or cotton.

"There seems to be a temporary world-wide catch-up on the part of the rayon producers as related to the consuming trade, but in my opinion this is bound to be only a temporary phase, the duration of which cannot be foretold but, at any rate, not very prolonged.

"The trend toward dull luster yarns, multi-filament yarns and finer sizes continues with increasing force and I believe in the near future a great deal of dull luster yarn will be used for wraps in all-rayon crepe de chines. At the present time, the knitting trade is the chief outlet for soft lusters.

"In the meantime, the rayon manufacturers are not letting up in their efforts to improve the all around quality of the yarn and the strength in particular. The best chemists in the world are hard at work on this problem and in this industry new things become old within a few months. This is particularly the case with some of the production methods

(Continued on page 148)

TABLE II—RAYON YARN IMPORTS, BY MONTHS

	1924 Lbs.	1925 Lbs.	1926 Lbs.	1927 Lbs.	1928 Lbs.	1929 Lbs
January	251,951	205,627	597,103	680,610	1,366,018	1,707,429
February	132,717	619,408	643,448	861,339	1,145,746	1,266,564
March	87,430	522,139	1,257,034	1,757,208	1,079,582	1,454,040
April	89,444	431,686	739,247	1,518,320	843,803	1,626,453
May	96,555	332,737	769,477	1,785,538	909,386	1,589,337
June	144,664	308,592	857,912	1,312,912	820,809	1,581,832
July	78,050	546,695	739,128	1,231,124	658,949	857,600
August	119,196	590,357	661,759	1,510,748	1,004,829	.....
September	181,614	622,304	878,604	1,129,476	924,219	.....
October	170,120	825,223	995,315	1,385,745	1,238,085	.....
November	170,238	1,118,679	964,164	1,285,157	1,003,681	.....
December	190,008	877,064	1,023,096	1,764,368	1,758,882	.....
Total	1,711,987	7,000,521	10,126,277	16,222,545	12,753,989	*17,285,580

*Total for year 1929 estimated on assumption that imports for last five months of the year would be maintained at same monthly average as during first seven months.

World Rayon Production

for 1929 Estimated at

396,125,000 lb.

THE estimate of the total world production of rayon in the year 1929 which, owing to the condition of the market, has been exceptionally difficult to ascertain, shows that there has been a slowing down in the rate of progress. This is not however altogether a bad sign. In fact, on the other hand, the large increase recorded in 1928 was, in the case of many countries, an unhealthy sign and at the end of the year there were large stocks left in several instances. During 1929 there has been a marked effort made to balance production and consumption and though the prices obtained, from the point of view of the producer, have suffered very severely in the process, there is no doubt that the industry today is on an economically sounder basis than it was nine months ago.

It was estimated that in 1928 the surplus production in Europe, that is to say the production over and above the home needs, approached 60,000,000 lbs. A small proportion of this was held in stock and the remainder was exported. In that year the demands of the United States were not large, Japan had ceased to count as an export market and India was not increasing her takings.

TABLE I—ESTIMATES OF WORLD PRODUCTION AND CONSUMPTION OF RAYON—1929

(In thousands of lbs.)

Country	Production	Imports	Exports	*Consumption
Austria	4,000	2,000	3,000	3,000
Belgium	16,000	900	6,000	10,900
Czecho-Slovakia	4,000	4,500	1,500	7,000
France	38,000	1,250	12,000	28,000
Germany	44,000	17,000	19,000	42,000
Britain	48,500	2,250	8,000	42,750
Holland	20,000	2,000	18,000	4,000
Hungary	700	1,400	600	1,500
Italy	50,000	1,000	32,000	21,000
Poland	5,500	1,500	2,000	6,000
Spain	3,000	4,500	.....	7,500
Sweden	350	1,750	.....	2,100
Switzerland	12,000	3,200	8,000	7,200
Others	1,000	.....	.....	4,500
Total Europe	247,050	.....	.....	187,450
China	.....	13,000	.....	13,000
India	.....	7,500	.....	7,500
Japan	14,000	.....	.....	14,000
Total Asia	14,000	.....	.....	34,500
Canada	3,750	1,500	.....	5,250
United States	131,325	17,250	.....	148,575
Others	.....	1,200	.....	1,200
Total N. America	134,750	.....	.....	156,950
Total S. America	1,000	6,000	.....	7,000
Australasia	.....	3,000	.....	3,000
Grand totals	396,125	.....	.....	386,975

*Including estimate of 1928 excess production absorbed in 1929.

TABLE II—ESTIMATED PRODUCTION OF RAYON BY PROCESSES IN 1929 IN VARIOUS COUNTRIES

(In thousands of lbs.)

Country	Total Production	Viscose	Acetate	Cupra	Nitro-Cellulose
Australia	4,000	4,000	.....	.....	.....
Belgium	16,000	9,000	4,000	500	2,500
Czecho-Slovakia	4,000	4,000	.....	.....	.....
France	38,000	31,000	5,500	1,500	.....
Germany	44,000	30,000	1,000	13,000	.....
Britain	48,500	34,000	14,000	500	.....
Holland	20,000	19,500	500	.....	.....
Hungary	700	.....	.....	.....	700
Italy	50,000	47,000	2,000	1,000	.....
Poland	5,500	3,750	.....	.....	1,750
Spain	3,000	3,000	.....	.....	.....
Sweden	350	350	.....	.....	.....
Switzerland	12,000	12,000	.....	.....	.....
Japan	14,000	14,000	.....	.....	.....
Canada	3,750	2,500	1,250	.....	.....
United States	131,325	110,525	7,500	2,300	11,000
Brazil	1,000	1,000	.....	.....	.....
Others	1,000	1,000	.....	.....	.....
Totals	397,125	326,625	35,750	18,800	15,950

TABLE III—WORLD PRODUCTION BY COUNTRIES

Country	1926 Thous. Lbs.	1927 Thous. Lbs.	1928 Thous. Lbs.	1929 (t) Thous. Lbs.
United States	62,575	75,050	98,650	131,325
Great Britain	25,500	38,803	52,000	48,500
Italy	35,000	36,000	45,000	50,000
Germany	26,000	31,000	41,000	44,000
France	17,500	21,000	30,000	38,000
Holland	13,500	16,500	16,500	20,000
Belgium	13,100	13,500	15,000	16,000
Switzerland	8,000	10,340	12,000	12,000
Japan	5,500	8,000	12,000	14,000
Poland	2,000	4,000	7,500	5,500
Austria	3,500	3,500	4,500	4,000
Czecho-Slovakia	2,800	3,500	3,500	4,000
Spain	300	1,000	2,500	3,000
Hungary	*	*	1,000	700
Canada	2,250	2,600	3,750	3,750
Brazil	*	*	1,000	1,000
All others	1,555	2,075	1,500	1,350
Totals	219,080	266,868	347,400	396,125

*Included in all others. (t) Estimated.

TABLE IV—WORLD PRODUCTION OF RAYON

(In thousands of lbs.)

Process	1928	1929
Viscose	293,320	326,625
Acetate	25,100	35,750
Cupra	13,950	18,500
Collodion	15,030	15,950
Total	347,400	397,125

The extra shipments therefore were directed towards China and the South American countries.

During 1929 it is estimated that the surplus production in Europe will amount to a somewhat similar total, to which must of course be added the stocks held over from 1928. At this stage of the year it is extremely difficult to estimate how this will be divided but there are efforts being made to send as much as possible to the East while in superior brands there is a good call from Australia, South America, etc. Above all, the export trade with the United States has developed to a very marked extent, though tariff fears are freely expressed and may in some measure account for the increased trade at present.

Good Progress in France

In Europe the most interesting country so far as production is concerned is France where producers, favored by low wages and a good demand, have not been so badly affected, as in other countries, by the various price reductions. It is estimated on a conservative basis that the French production this year will reach 38,000,000 lbs., against 30,000,000 lbs. in 1928 and 21,000,000 lbs. in 1927. The French import trade is not now very large and shows little sign of change. The export trade, which in the last three years has shown a very large increase over the 1924/5/6 figures, is rather better this year, which in view of the world conditions may be regarded as highly satisfactory. It would appear however that most of the increased French production has been absorbed in the home mills and there is no indication of falling-off in trade. The number of new companies formed has been again a characteristic feature of the year in the French industry.

Germany has gone through a very difficult time and the position even now is that it is possible for only the larger and better established companies to work on a profitable basis. Nevertheless turnover has been good and in total it is estimated that production this year will show a slight increase over last year. Imports have continued their declining tendency while exports have shown a marked increase, which factor has no doubt contributed to the more optimistic outlook which the leading producers are now taking regarding the immediate future for the industry.

Decline in Great Britain

In Britain it would appear that production has declined this year but it is not easy despite the official returns issued to get at the exact position for the reason that yarn and waste are classified together in the production returns and separately in the excise statistics. The latter more truly represent the sales and from these it is ascertained that the sales of singles, yarn and straw in the first half of 1929 amounted to 24,223,551 lbs. against 25,193,674 lbs. in the corresponding period in 1928 and 16,507,812 lbs. in 1927. On the other hand sales of waste in the first half of 1929 amounted to 1,587,310 lbs. against 1,009,859 lbs. in 1928 and 631,179 lbs. in 1927.

Stocks accumulated slightly further in the first three months of the current year but there was a definite check put on this in the second quarter when the home consumption reached record proportions. Exports were considerably lower than in 1928 but at that time fairly large quantities of poor grade rayon, largely the first outputs of new producing companies, were being sent abroad.

In Holland there has been a further increase in production coinciding with increased exports and the trade though necessarily not providing the margin of profit hitherto enjoyed is fairly satisfactory. In Italy, the position is rather obscure but it is apparent that there have been large stocks of yarn to clear off and it is probable, though statistics are not available, that these have been going to the East as well as to Germany and the United States. The prices obtained have been very low and though the price agreement arrived at between the larger producers has been in force for some time, it is not yet possible to say how far it has been of great assistance. There has been little change in the total turnover of yarn in the Swiss industry.

Production by Processes

The table showing the production of rayon by processes indicates a further advance in the output of acetate, particularly in France and Belgium. The cuprammonium production has also increased but in certain cases the Bemberg subsidiaries are not yet in full working order and the output therefore may be expected to still further increase in the next two or three years. The British output has temporarily declined but when the Bemberg plant at Doncaster is working it is expected that this will go up very rapidly.

Outbreak for Next Year

The outlook for 1930, so far at least as Europe is concerned is too obscure to allow of estimates being given with any degree of confidence. Speaking generally the gradual improvement in the market conditions points to an expansion in production in almost every country. Britain is likely to show a marked increase especially perhaps in acetate and cupra, though silk duty fears will make for conservatism in some quarters. Germany and Holland are likely to proceed on sound rational lines. There is no likelihood of a check in France where big progress is anticipated, while slow but steady advance may be expected in Switzerland and Belgium. Italy seems likely to continue to consolidate her position for some little time, though in common with all countries the outlook is brighter.

Urges Broader Study of Synthetics

Consumers Should Familiarize Themselves With Uses of Various Sorts

WASHINGTON, D. C.—Further rise in the production and sale of rayon yarn was predicted by Dr. Julius Klein, Assistant Secretary of Commerce, in a radio address on Sept. 22. Dr. Klein said that rayon production this year was 25% greater than last year, with imports 50% larger than during the first seven months of last year.

The speaker referred to the consumer attitude on rayon, and urged that the public learn to familiarize itself with the different types of synthetic yarns and their individual uses. He said knowledge in this field would help toward more satisfactory use of the various rayon and other synthetic yarns. Certain yarns, he pointed out, are more particularly adapted to certain purposes than others, and he added that a broader public knowledge on this point would help both the consumer and the rayon industry as a whole.

He stated that the advent of rayon has not resulted in any decline in silk consumption, pointing out that silk consumption has risen each year since 1924.

PIONEERS . . . in Synthetic Fibers

The story, briefly told, of some of the more important men and discoveries that have helped to make a great industry, which is chemical as well as textile.

By Westford

THE writer's first practical acquaintance with a synthetic fiber was in the early years of the World War. The supply of black dyes for coloring worsted pieces containing white silk effects had become exhausted. Logwood (or hematine) was the only black available and it stained silk. Thus the comparatively new and unfamiliar "wood silk" came to be used in place of natural silk because it would remain white while going through the logwood black dye bath. All textile men knew that artificial silk was being made, but few had ventured even at that time to do much with it.

Synthetic fibers are fibers made by synthesis, "the art or process of making a compound by combining ingredients," as practiced by the chemist. Unfortunately the first of these fibers, rayon, was brought out as an artificial silk. It was, and is, artifiical in the sense of "not natural"; and of being "made or contrived by art." But the word artificial also may carry the implication "not genuine." Hence the wise and successful move to substitute rayon as a general name for the fiber that has found so many uses that have no relation to silk.

Synthetic fibers also include those that may substitute for or mix with wool, yarns that resemble pongee, and a few other special products.

All synthetic fibers of any importance are made from cellulose, either cotton or wood pulp; and whether put into the nearly endless form of rayon, or into the short length or staple fiber, the materials are made by the same fundamental methods and have the same history.

The natural fibers were used even in prehistoric times and have come down to us in legend and quite ancient history. We can guess that some very early man may have watched a silk worm making a cocoon or a spider a web, and wondered how he could make a thread or a garment in some manner. As far as we know, however, no man ever made either until a relatively few years ago. And, as far as we know now, the first man to indulge in such speculations and to write them down was Robert Hooke, well known to physicists for Hooke's law.

In his *Micrographia*, published in 1665, he discussed the subject, "Of Fine Waled Silk or Taffety," and included a paragraph that has often been quoted, but is always interesting for its quaint wording and ideas.

"A pretty kinde of artificial Stuff I have seen, looking almost like transparent parchment, Horn, or Ising-glass, and perhaps some such thing it may be made of, which being transparent, and of a glutinous nature, and easily mollified by keeping in water, as I found upon trial, had imbibed and did remain ting'd with a great variety of very vivid colors, and to the naked eye it looked very like the substance of the silk. And I have often thought, that propably there might be a way found out, to make an artificial glutinous composition, much resembling, if not full as good, many better, than that Excrement, or whatever other substance it be out of which, the Silk-worm wire-draws his clew. If such a composition were found, it were certainly an easier matter to find very quick ways of drawing it out into small wires for use."

Hooke's suggestion was evidently not followed, perhaps because there was no sufficiently "ingenious inquisitive Person."

The next suggestion was recorded nearly a century later by Reaumur, better known for his thermometer scale. "Silk is only a liquid gum which has been dried; could we not make silk ourselves with gums and resins? This idea which would appear at first sight fanciful, is more promising when examined more closely. It has already been proved that it is possible to make varnishes that possess the essential qualities of silk. China and similar varnishes are unaffected by solvents; water has no effect on them, the greatest degrees of heat to which our fabrics are exposed could not change them. If we had threads of varnish we could make them into fabrics which, by their brilliancy and strength, would imitate those of silk, and which would equal them in value, for good varnishes when properly dried have no smell. But how can we draw out these varnishes into threads? We cannot, perhaps, hope to draw out these threads as fine as those obtained from silk, but this degree of fineness is unnecessary, and it does not seem impossible either to spin them as fine as natural silk, when we consider to what extent art may be carried."

Thus some years before the Revolutionary War came a proposal that has since been realized in threads of rayon, and in a varnish similar to it, the cellulose lacquers for our cars.

Neither of the men quoted seems to have tried to make threads, and were they not scientists who gave serious thought to such matters, they would have had little more consideration than imaginary writers of fiction who propose wonderful things in their stories.

Period of Real Development

Far more credit belongs to the workers of the next century when there was some knowledge of chemistry. They did many things that are still of use, for although

the great development of synthetic fibers has been within the past decade, some of the necessary discoveries and inventions were made almost a hundred years ago.

Whether the rayon industry is of French or British origin is largely a matter of opinion, for both countries can justly claim a great share in its development. More of the methods that have survived were discovered in Britain than in France, but it was a Frenchman who made the first real commercial material from nitrocellulose. It was also a French firm which made the first commercial viscose threads, in 1903. According to C. F. Cross this plant inspired the later great British projects. The United States, Germany and Italy have contributed much less of fundamental importance, although outstanding in later technical developments.

Three early events which were forerunners of rayon came in the 1840's. The observation of a Saxony weaver who noticed fibers being accidentally ground from a board led to the idea of substituting wood for old rags in paper making. After many other contributions we finally got the sulphite process for making the wood pulp, from which about 80% of world's rayon is made.

Another contributing discovery was that of Mercer in 1844. His scientific study of the action of caustic alkali on cellulose led to the present-day process of mercerization. The same reaction conducted in a slightly different manner is an essential step in the preparation of viscose.

The third event, even more closely related to our subject, was the invention by Louis Schwabe, a silk manufacturer of Manchester, of a machine for making fine filaments or threads by forcing a thick liquid through fine holes. His purpose was evidently to try to make some sort of artificial silk. He searched for a suitable liquid and produced fibers, but died before he had any real success.

Ozanium, about twenty years later, in 1862, is also credited with the proposal to force suitable solutions through fine holes in order to imitate the silkworm. Thus the spinnerette appeared twice in the very early history of synthetic fibers.

There seems to be some doubt and disagreement about exact details of this early history, and only enough will be presented to give a general idea of the origin of some of the discoveries and of progress in applying them. They go back to an earlier time than most of us suspect.

The discovery of cellulose nitrate came long before its successful use in making a textile fiber. Pelouze in 1838 made experiments on the action of nitric acid on cellulose in the forms of paper, linen and cotton. Other investigators developed the idea of nitration and, as early as 1848, the solution of cellulose nitrate in ether and alcohol, or in other words collodion, was proposed for use on wounds as a dressing.

An early textile proposal foreshadowed nitrocellulose coatings and lacquers. Parkes, in 1855, patented the use of the nitrate to provide transparent protective coverings for "silk tinsel articles or other textile fabrics, sewing thread, worsted, string, felted goods" and films for bookbinding.

The First Real Rayon

In 1855, Audemars, of Lausanne, preceded Chardonnet, who is much better known, by nearly thirty years, in obtaining a patent on the use of nitrocellulose for making artificial silk, the first patent for this synthetic fiber. He apparently made his threads by drawing from a large bulk of liquid by the aid of a steel point, rather than by means of a spinnerette.

More successful was Sir Joseph Swan, manufacturer of photographic collodion, co-worker with Edison, and originator of photographic and electrical inventions of inestimable value. He first made carbonized filaments for electric lamps, but in 1877 turned his attention to textile possibilities. He soon made filaments by squeezing collodion through fine orifices, denitrated them to remove their property of burning explosively, and exhibited fabrics in London by 1885, which were designated as artificial silk. By some, therefore, he is considered the real inventor of this synthetic fiber.

Count Hilare de Chardonnet, who began his work at about the same time, 1878, and obtained his first patent in 1884, is called by general acclaim the father of this great industry. He it was who first made a rayon factory a going concern, and the manufacture of synthetic fibers a real business, and this was not until 1891.

Thus the pioneers who were at all successful called their product artificial silk, just what it was intended to be, a substitute for silk, now a use long since outgrown.

Cuprammonium and Acetate Fibers

The history of another of the rayons, that made by the cuprammonium process, is much the same. The fact that cellulose could be dissolved in a suitable alkaline copper reagent was first discovered by Schweitzer in 1857, and first applied by Weston in 1882, again for the making of incandescent electric lamp filaments.

Various French experiments made this the second type of rayon to be developed, although at first with indifferent commercial success. Then Germany entered the field, and after perfecting the cuprammonium process for making lamp filaments, it was found possible to draw the heavy filaments, by stretching, down to the fineness required for textiles. Thus in 1899 an incandescent lamp factory became the Vereinigte Glanzstoff; and much of the finest denier present-day rayon is made by the cuprammonium stretch-spinning process.

Next, chronologically, comes cellulose acetate, first prepared by Schutzenberger and Naudin in 1869. The industrial history of this compound did not begin until 1894, when it was found that zinc chloride or sulphuric acid catalyzed or promoted the chemical reaction of its formation. Cross and Bevan, who are so much better known for their discovery of viscose and pioneer work on it, took out the first patent for the technical application of the acetate, and some of the early products were intended for commercial use as textile finishes.

Evidently Bronnert, in Mulhouse, made the first cellulose acetate textile fibers, but did nothing with them. American inventors, notably Mork, Little and Walker, patented in 1902 their invaluable contributions to the technic of this material. Little had already used it, like the inventors of all other kinds of synthetic fibers, for making carbon lamp filaments. Soon the United States contributed the first commercial success of the cellulose acetate textile fibers, for Lustron was regularly on the market before the war.

The main development of cellulose acetate came during and after the war. There was a great demand for the acetate for use in solution as a dope or a sort of varnish to coat airplane wing fabrics. The best was obtained from the Dreyfus brothers in Switzerland and as the demand increased they were invited to England to establish a factory for this essential war material. When this requirement was suddenly diminished at the close of the

(Continued on page 100)

AMALGAMATION

Is Europe's Method of Meeting Problems

In Rayon Industry

DURING the last 12 months the European rayon industry has gone through an exceedingly difficult period. During 1928 production of viscose silk in all the producing countries gradually overtook demand. The formation in many countries of a large number of new companies, had put on the market large quantities of viscose yarn of indifferent quality, and while demand continued to be keen for the high grade yarns, there was a surplus of the lower grades.

In most countries, the weaker companies, not having sufficient capital resources to wait until demand broadened, started to sell their yarns at very much reduced prices. In many cases where competition was keenest prices fell actually below production costs. The result of this was that prices in practically every country were forced to a much lower level than they had ever been before. A year ago the trouble had begun in some countries and during the following two or three months, competition between the different producers presented a stern struggle. Naturally a good deal of money was lost and in some countries the struggle resulted in the liquidation of some of the weaker concerns. The "weak selling" of cheap grade yarns naturally affected the sales of the better qualities and they too were sold at a lower level.

The last six or seven months has seen a slow but steady recovery and while in some countries the productive capacity is too large, output has been regulated to demand, and trading, generally speaking, not only has been restored to normal, but in many countries is assuming record proportions. The methods, which the most seriously affected countries adopted, to overcome the difficulties and to insure that no such crisis should take place again, provide a very interesting story.

Thus it is largely through the crisis of 1928, that we have virtually the whole of the Dutch industry combined with the most powerful group in Germany. Moreover there are likely to be further extensions made to this group, so that it will include an even larger section of the German industry. In Italy, the country most seriously affected by the crisis, we now find the leading producers working together, and in Belgium serious attempts are being made to bring about a similar state of affairs. It is probably true that many of these cartels would probably have come in any case, but it would have been some years before this would have happened in the normal course of events. France is the only country where there was very little check on the further increase in production, and France has gone a step further by launching out with her acetate patents into other countries.

It is probable that there will be future occasions when demand will be less than supply, and though this will probably mean further reductions in prices, there should not be a serious price cutting crisis similar to that from which the trade is just recovering. The industry has learned its lesson, and will now be better able to weather future storms.

Cooperate on Technique

The technical side has of course gone on uninterruptedly, and it is here that cooperation has reached an even more advanced stage than it has on the commercial side. Representatives of the leading companies in Europe have met together, to discuss such important questions as the standardization of rayon, on a number of occasions during the period under review. Though nothing has been announced as to the results of these conferences, good progress in a very difficult task is believe to be taking place.

The question of standardization of rayon, is probably even more important than the two other great problems, viz. the reduction of cost and the increase of strength. It is generally considered among people in the trade in Europe, that if all yarn could be guaranteed to be a certain strength and quality, the consumption would go up very considerably because manufacturers would be able to place their utmost confidence in rayon, and know exactly what to expect from a certain priced and classified yarn.

An important feature of the rayon industry in Europe during the last 12 months has been the big increase in demand for acetate, and though plans are being put into operation for vastly increasing the supplies, the day when there will be an overproduction seems a long way off at present.

Germany

During the last 12 months, developments of international importance have taken place in the German rayon industry, with far-reaching effects on the industry as a whole. The country has passed through a difficult trading period, but the progress made in the rationalization of the industry has been remarkable.

The first important event was the formation by the Glanzstoff Co. of the Associated Rayon Co. This is a large holding company of which Dr. Blüthgen is president, and which was formed in New York in the closing months of 1928, to acquire a substantial interest in all the Glanzstoff subsidiaries and participations. Ever since the war the Glanzstoff Co. apparently has adopted the policy of never fighting a competitor in the rayon market, but either gaining control in the share capital or else reaching some form of agreement or alliance.

Developments had been so rapid that the Glanzstoff Co. at length found it necessary to form a holding company to look after its participations.

The new company included in its investments the Glanzstoff holdings in the Dutch Enka, Snia Viscosa, German Bemberg, Austrian Glanzstoff, the Asahi Rayon Co. of Japan, American Enka, Glanzstoff and Bemberg, etc. The fact that the company was formed in the United States merely reflects the weakness of the German capital market. The Glanzstoff Co. however has complete control of the new concern, which has made an exceedingly powerful group and which will be able to continue the policy of gradually acquiring more and more rayon plants. This event, together with those which have happened since, makes one wonder whether the whole industry will not eventually be grouped together into one huge combine.

The other event of outstanding importance was the joining together of Glanzstoff and Dutch Enka, into the General Rayon Union, but as this company is based on the Enka Co. it will be dealt with more fully under the heading of Holland. The complete cooperation of these two huge concerns was an even more important step in the "World Cartelization Policy" than was the formation of the Associated Rayon Co.

Price Agreement Collapse

The third chief item of interest was the collapse of the price agreement set up by the German Viscose Convention, which, while being more of a domestic nature than the two mentioned above, is a matter of economic importance to the European industry as a whole.

During the fall of 1928 when over-production and price-cutting were at their worst, certain Italian companies sent large quantities of rayon into Germany which they sold at prices well below those set up by the convention. Hitherto Germany was the only country where the price level had held firm and weak selling had not taken place. As long as demand was ahead of supply, the competition from Italian yarn was not really felt, but when certain of the Italian manufacturers were endeavoring to get rid of their surplus production, they found Germany, a market where prices had held firm, a particularly happy hunting ground.

One by one the members of the convention started to sell below the convention level. The two largest producers, Glanzstoff and the I. G. Farbenindustrie, failed to come to any agreement in policy. The former was in favor of maintaining prices and coming to an agreement with the Italian producers and the latter wanted to fight the importers on the question of prices. The result was that the prices of rayon in Germany became chaotic, and not until the summer trade when consumption went ahead with a rush did they ever again harden.

Since then the Glanzstoff and I. G. have again entered into negotiation and at the time of writing, while no definite agreement has so far been reached, there seems to be every prospect of an arrangement being arrived at, this fall. The I. G. is willing to sign a new agreement as soon as a satisfactory basis can be arranged, and they also favor the establishment of selling quotas. Glanzstoff has suggested the formation of a sales convention somewhat on the lines of the Italian Convention, and a committee composed of delegates of the two concerns has been formed to study and report on the Italian selling system. There is however still no sign of agreement between the Italian and German producers with regard to imports, but the formation of the Italian Convention, though only directly affecting the home market, must certainly have had influence in decreasing "weak selling" in the export markets. The formation of the General Artificial Silk Union will virtually cut out competition from Holland.

A feature of the last two years in the German industry has been the progress made by the I. G. Farbenindustrie in increasing its production capacity, and a number of people believe that the firm is making an endeavor to get control of the industry in Germany. The company has moreover exceptionally large financial resources, though Glanzstoff's move in the formation of the General Artificial Silk Union, on the board of which Courtaulds have a seat, may have made their task rather too large for them.

Apart from extensions to existing plants and the formation of one or two small new companies, developments in the production line in Germany have not been rapid during the last year. During the last few months, business in the home market has returned to normal and may have even been larger than at any time during 1928. In the first six months of the year there was a big increase in the total exports, but this is more than accounted for by sendings to the United States and Czecho-Slovakia the two largest markets. In other directions exports in most cases have shown a decline. Imports have also declined considerably.

Italy

In the last 12 months, the Italian industry has had an exceedingly difficult period to go through. Since the Italian producers cater to a large degree for the supply of the comparatively cheap types of yarn, the over-production slump probably hit them worse than any other country during the second half of 1928. In many of the export markets price cutting became exceedingly severe, but in most cases consumption decreased considerably, and on account of her low costs of production Italy was able to compete with importers from most other countries without making serious losses.

It was however in the home market that the worst competition arose. For many months the various rayon producers were cutting each other's throats by selling below production cost. This had a profound effect on the world markets for cotton and rayon mixture piece goods. As a result of this hopeless price cutting the Italian weavers were able to place fabrics on the market at prices with which British and German manufacturers could not compete. It was obvious however that this state of affairs could not go on much longer, and that the various companies concerned would eventually pass out of existence if wholesale "weak selling" at prices below production cost was to continue.

However, headed by the Snia Viscosa Co., a desperate effort to secure cooperation between the individual producers eventually resulted in the formation of the now famous Italian Convention. This was arrived at by the beginning of April, and its members include Snia Viscosa and Varedo, Soie de Chatillon, and Soc. Generale della Viscosa. The convention has one central sales office and prices are on a fixed basis. The orders are divided among the members of the convention according to the ratio of their capacities. Thus the Snia Viscosa Co. with Varedo gets 50% of the sales, and Soc. Generale and Chatillon approximately 25% each.

The convention however only applies to the home market, and only includes viscose rayon. So far it has

worked successfully and it is obvious that such a scheme would do away with price cutting. The only important producers outside the convention are the Italian Enka Co., Orsi Mangelli, and Manifatura Seta. As previously mentioned, the Italian weaving industry has made good progress in the eastern markets on account of the low price of yarn. Italy has also sent a considerable amount of yarn to China and other eastern markets during the first half of the current year.

It is naturally not surprising that, in view of the over-production of viscose rayon in the country, there should be no new company developments in this connection during the period under review. A new acetate company to work the "Rhodiaseta" patents has been formed however by the Usines du Rhone in conjunction with the Montecatini Chemical Co. The company is known as Rhodiaseta Italiana and is building a plant at Pollanza near Lake Maggiore, which is to have a capacity of 1,500,000 lb. per annum. Edmond Gillet, who is a director of the Du Pont Rayon Co., is included on the board.

Holland

The last 12 months will be looked back upon in the Dutch rayon industry as a period of complete cartelization of the most important companies within the country, followed by the establishment of the cartel with the most important company in Germany. There have been various attempts in the past on the part of the larger European rayon concerns to try to get control of the comparatively small but exceedingly successful Dutch Breda Co. During the last 12 months, the Dutch Enka Co. has acquired controlling interest in the company's share capital, and at the Breda annual meeting of the company, it was announced that with complete maintenance of each other's independence, cooperation between the two concerns had been reached in so far as such cooperation was deemed to be in the interests of either company. Dr. Hartogs, the chairman of the Enka Co., was appointed a director of Breda.

This took place in Jannuary and in June news came through of the all-important Enka-Glanzstoff fusion by the formation of the General Artificial Silk Union. The three main reasons for the amalgamation were said to be the combining of technical experience, reduction in competition and the consolidation of the rayon market. The question of the two companies being of different nationality meant that a complete merger in the strict sense of the word was not possible. It was therefore arranged that Glanzstoff shares should be exchanged for shares in the new company which was formed on the basis of the Enka Co., the latter changing its name to Algemeene Kunstzyde Unie (General Artificial Silk Union). 2,700 mark Glanzstoff shares were exchanged for 2,000 guilder shares in the new company. Dr. Hartogs became joint manager with Dr. Blüthgen of both the Unie and of Glanzstoff, and Courtaulds were given a seat on the Board of Directors. It is very difficult to realize the far-reaching effects this fusion may have, and any attempt to show by diagram the connections of the various European rayon producers now becomes even more complicated than before, and is in fact hardly possible.

During the period under review the two Dutch concerns have had a comparatively prosperous time, and were in fact affected by the price depression to a less extent than producers in almost every other country. Dutch exports of yarn during the first six months of 1929 which account for the bulk of the production are considerably up when compared with last year. The only other interesting development has been the manner in which the Enka Co. has put into practice its plans for the large scale production of acetate rayon. A subsidiary known as the N. V. Drya has been formed by the company in conjunction with the Lonza Chemical Co. of Basle, and is building a plant for the production of 1,000,000 lb., at Nijmegen. There are also two other Enka acetate subsidiaries, the N. V. Fluida and the N. V. Plumba.

France

France is perhaps the only producing country of importance where company developments have gone ahead unchecked by the world depression in the industry during the last 12 months. Largely on account of its extremely low production costs, and the enormous potentional consumption capacity of the home market, France is now heading to become the largest rayon producer in Europe, and though the present capacity, including that of the half-constructed plants, is probably still smaller than that of Italy, there seems little doubt that in the course of the next two or three years, France will overtake the latter country. About a year ago there seemed to be considerable doubt as to whether there would be a market for all the yarn supplied by the new plants, but doubts have been set at rest to a large extent by the extraordinary manner in which home demand has gone ahead.

The balance sheets for most of the more important French companies show substantially larger profits for 1928 than for the previous year. On account of the low production costs French producers for the most of the year were able to compete, with still considerable profit margin with the reduced Italian prices. Towards the end of last year stocks became very large and there is little doubt that many companies experienced serious difficulties. France was later, however, in feeling the effects of the general depression in the industry than any other country, and as far as could be told was, with the possible exception of Hollnad, where there are only two companies, quicker than any other country in recovering.

The year 1929 commenced with very large stocks and a comparatively poor home demand, but trade quickly recovered and now stocks have resumed normal proportions. A feature of the home market has been the tremendous increase in demand for acetate rayon, and there is little doubt that demand will continue ahead of supply until the new plants in course of construction are in a position to meet the demand.

In this connection the Kuhlmann Chemical Co. has largely been responsible for the main developments. The Kuhlmann subsidiary, Textiles Chimiques du Nord et de L'Est, in conjunction with the Rhodiaseta Co. and the St. Gobain Chemical Co., has formed a large new acetate company with a capital of Fr. 60,000,000, and it is hinted that the subsidiary of Kuhlmann is planning the erection of yet another acetate plant. There has been also a marked shortage of cuprammonium rayon and in addition to a larger home production, imports from Germany have almost been trebled during the early months of this year. The Bemberg subsidiary, the Cuprotextile, however, is greatly extending its plant, and the Soie Cuproammoniacale de Chauny, is building a large plant to work the "Kuttner" cupra process. There is also a rumor of a new cupra factory to be

erected at Troyes by a group of hosiery manufacturers.

Another interesting company development is the formation of the Franco-German Rayon Co., with a capital of Fr. 50,000,000, which is to work a new butyrocellulose process. This company has been formed by the Chemnitz textile machinery firm of Oskar Kohorn, and Societe le Franc of Paris. The most interesting foreign developments have been in connection with the "Rhodiaseta" patents, and companies to work these have been established during the present year in Italy and Switzerland. The Soiries de Strasbourg has concluded an agreement with the Sofilaine Co. in Belgium by which the latter increases its capital and there is a share exchange between the two concerns. The Societe Financiere Internationale de Soie Artificielle, the French subsidiary of International Holdings, is said to be planning the formation of a large vertical rayon combine in America.

During the second half of this year the production of rayon in France should show a considerable increase as there are a number of new plants which will have reached the production stage. The trade generally however seems to be of the opinion that there will not be more than a temporary difficulty in absorbing all of it. It is probable that the profits of the leading French companies will show a decrease in 1929 when compared with the previous year, owing to the low prices prevailing during the early part of this year.

Belgium

Partly owing to a general depression in the textile industry, the Belgian rayon industry was hit rather badly by the overproduction slump at the end of 1928 and during the early months of 1929. Competition was extremely keen during the second half of 1928 and stocks became large. There has been a slow but steady improvement during recent months but business is still not considered as good as it ought to be.

There are however some very interesting developments pending. For some time now negotiations have been going on for the formation of a Belgian rayon trust amalgamating a number of the most important producing companies, and thereby avoiding unnecessary competition and cutting down the production costs. The prime movers behind this scheme are the Societe Generale de Belge and the Mutuelle Solvay Co. These companies between them are believed to have nearly a controlling interest in the Tubize Co. and the Soie d'Obourg. It is proposed that the new trust should include the shares of all the Belgian rayon companies of any importance.

The Union Chimique Belge and the Soie d'Obourg formed during the year a company for the supply of raw materials to the rayon industry, which is known as the Societe Industriale et Commerciale Produits Chimiques, and has a capital of 50,000,000 francs. The Breda subsidiary, the Soie de Valenciennes, is planning complete financial reconstruction as it is to be merged into a new Franch company. The Filsoietis Co. of Ghent has been taken over by a large new company known as the Soie Artificiale du Ghent, and the plant is to be increased. The Soielaine has increased its capital and is to exploit the Brouneot patents in Belgium and several other countries.

Switzerland

The rayon industry in Switzerland suffered in common with the other European countries, and though the position was not so serious as in the case of Germany, Italy or Belgium, there was a substantial over-production, and price cutting resulted. During the present year, however, though the price level has been substantially lower, there has been good demand for rayon in the weaving and hosiery mills.

With the vast increase in the demand for 100% rayon fabrics there has been a corresponding increase in demand for acetate rayon, and as there is only little produced in the country yet, quantities have had to be imported. The Nova-Seta Co. however is nearly ready for production of this type of rayon—and of cuprammonium of which there is also a shortage. This company however is not likely to solve the problem, and a new "Rhodiaseta" acetate subsidiary has been formed. Nothing is known at present as to the size or situation of the plant.

Other Countries

Of the remaining countries, all of which have suffered to a varying degree from the effects of the general overproduction, there is practically nothing to record in the case of Spain, Czecho-Slovakia or Austria. Very careful study apparently has been given by large producing companies to the possibility of the establishment of plants in Mid-Europe, and it is probable that rayon may be produced at very low cost prices in some of these countries.

Conditions at present however seem rather against immediate development. The Glanzstoff Co. has decided not to proceed with its subsidiary in Rumania, formed last year, and a new venture in Jugo-Slavia to be worked by Chemical and Wood Industries, Ltd., is also to be suspended. During the year a "Borvisk" subsidiary company has been formed at Danzig. It is not known how large this plant is to be but it expected to give employment to 3,000 operatives. From time to time there have been rumors of new plants in Hungary and Poland. and the name of Courtaulds has been associated with developments in both of these countries.

Plans for a very large production in Russia have been discussed by the Soviet Silk Trust, which last year made a tour of the principal European rayon producing countries. A company known as Hauptausschuss Fur Kunstfaser Industrie has been formed and is to build a large number of plants. So far arrangements have been made with Oskar Kohorn of Chemnitz for the equipment of two plants at Mohileff and Klin, with a large production. In addition to supplying the machinery, Kohorns are to give technical assistance for a period of five years. Negotiations have also taken place for the establishment of a Bemberg plant in Russia but at the time of writing this development seems unlikely to mature.

A rayon plant is also to be constructed in East Russia on the banks of the Kama in conjunction with a large new cellulose and paper mill which is to be started near to Sverdlovsk. The plans for the production of rayon in Russia are certainly very ambitious, and what every one in the trade in Europe is wondering is how it is all going to be consumed. At present the consumption of rayon in Russia is exceedingly small, because the home producers have not yet reached a high standard of efficiency, and the import duties are practically prohibitive. Encouraged by the Government, however, a large consumption may spring up, through it will be some time before the local textile manufacturers will be able to weave it efficiently.

British Rayon Producers...

Most Are in Improved Position, But Many Weak Units Exist

By J. Guthrie Oliver

FROM an economic standpoint the last 12 months have probably been the most interesting in the history of the industry. In the previous 12 months, production of certain types of rayon had gradually overtaken demand, and in the last year this state of affairs reached what might be described as a crisis, and we have since seen the industry slowly but steadily recover. During 1928, for the first time, the older and well-established producers had to meet the inevitable competition from the large number of new producing companies which were floated as a result of the false stimulus given to the industry by the imposition of the import duties in 1925.

More serious than the competition between the old and new producers, especially during the first half of the period under review, was the competition of the newer producers among themselves. It was obvious of course that, so much better equipped both technically and financially, the older concerns should be able to monopolize the market at the prices then ruling. Thus the newer companies, which were in too serious a position financially (not having had sufficient capital resources from their commencement) to carry large stocks of yarn, adopted the policy of cutting prices to obtain orders for their yarns, which were almost invariably inferior in quality to those of experienced producers.

During the fall of 1928, the first part of the period under review, the stock position became exceedingly serious, so much so that price cutting or "weak selling" as it is more exactly expressed, completely demoralized the market for standard yarns, and the leading acetate and viscose producers were each forced to lower their price level very substantially. In view of the large strain this was bound to make on their margin of profit, the leading viscose producers were reluctant to follow the move of the acetate producers, and for about a month round about November, the market became stagnant waiting for the leading viscose producers to make a move.

The subsequent lowering of the price levels had the desired effects so far as the older firms were concerned, and since then they have had little difficulty in obtaining business, and sales have gradually expanded. At the time of writing, however, after an excellent season for dress goods (in fact the largest home consumption on record has been absorbed during the summer season) the three largeset viscose producers, have each a considerable amount of new plant ready to put into operation as soon as demand warrants. This tends to show that consumption has not expanded quite so rapidly as had been anticipated. This is of course due to some extent to weavers and knitters "fighting shy" of rayon on account of the unsatisfactory nature of much of the yarn supplied by the younger and inexperienced producers.

The position since the price reduction however has continued to be extremely serious for the newer companies, and though price cutting has continued they have been forced to limit their production to a considerable extent. The price war incidentally proved to be the ruin of at least two of the new companies. Both Western Viscose and Sunsheen have gone into liquidation during the early months of this year, through not having sufficient resources to carry on. There are moreover several other companies which are in a very serious position and are in fact negotiating with other concerns to try to get them to take over their plants. There is a possibility that more of the new companies formed in 1925 and since will eventually become holdings concerns. Last year, it will be recollected, the Bulmer Rayon Co. became a holdings company in British Acetate, the latter concern taking over its plant; and now more recently British Visada, which was also financially embarrassed, has sold its plant to the British Breda Co., a subsidiary of Dutch Breda, in return for shares.

Rayon Combine Discussed

The problem of the weaker rayon producers and their possible salvation, is a matter which has been given considerable attention by large industrialists during the past few months. It is of course very difficult to come to a satisfactory agreement, but negotiations have been taking place for the establishment of a rayon combine, to include a number of the smaller companies, who are technically on the right lines. It has been suggested that the concerns included should each specialize in certain deniers and qualities of rayon, and that there should be a common sales office, on the lines of the Italian Convention. This method would eliminate price-cutting and production could be regulated according to demand. It is obvious, moreover, that a small plant running on one or two different deniers, could be worked more economically than if it were run by one firm and had to make small quantities of a large number of different deniers and qualities.

One naturally wonders whether such a combine would offer serious competition to the older and well-established producers, but it seems fairly obvious that competition from a strong concern would be much more satisfactory than that from a large number of small companies, which completely destroy the stability of the market. The industry, for steady expansion, must have stability in prices so that the manufacturers are able to place forward orders with a considerable degree of confidence.

It is probable therefore that such a combine would be in the general interests of the industry.

Statistical Position

During the period under review, as hinted above, the British rayon industry has not been working to full capacity. A year ago stocks were already high and each quarter showed that a considerable amount had been added thereto. During the last 12 months, however, production has gradually been adjusted to the demand which has steadily increased, and during the second quarter of the year, when as previously mentioned consumption reached a record level, the amount added to stocks was quite a negligible figure.

Of course during the last 18 months we have produced a large quantity of yarn which has not been consumed, and this amounts to approximately 2,000,000 lb. It should be borne in mind that a very large quantity of this is probably of inferior quality, and may never find a market. Though we have succeeded in bringing production and consumption into harmony during the second quarter of the year we have not yet made any impression on stocks. In the following table is shown the course of production and consumption of yarn and waste, during the whole of the period since production overtook demand. The figures are compiled by comparing the Excise figures, which represents actual sales, with the monthly official Production figures.

BRITISH PRODUCTION AND CONSUMPTION OF YARN AND WASTE

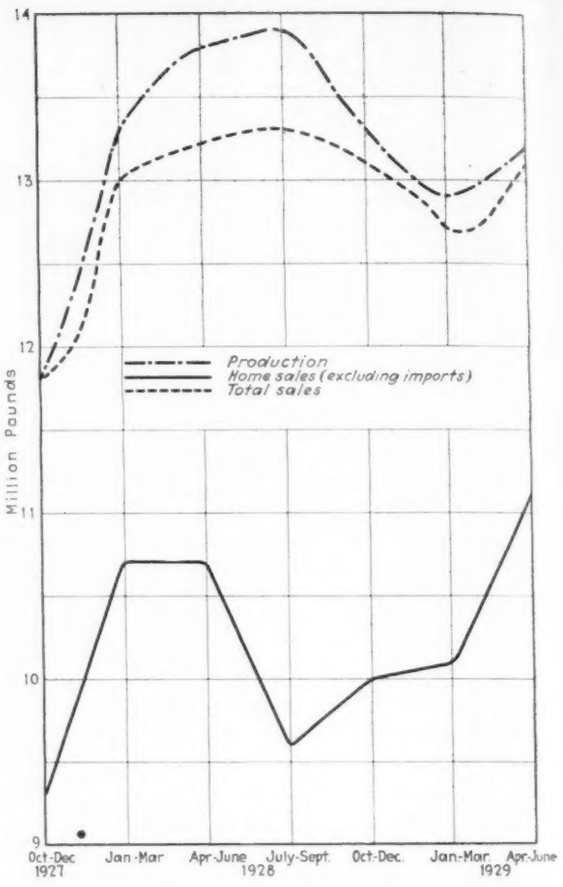
	1928				1929	
	Thousand Lbs.					
	1st Qr.	2nd Qr.	3rd Qr.	4th Qr.	1st Qr.	2nd Qr.
Production	13,300	13,800	13,900	13,300	12,900	13,200
Excise	13,000	13,200	13,300	13,100	12,700	13,100
Exports	2,300	2,500	3,700	3,100	2,600	2,000
Imports (net)	700	700	600	600	400	500
Consumption	11,400	11,400	10,200	10,600	10,500	11,600
Added to stock	300	600	600	200	200	100

The table shows that production during the last nine months has been considerably smaller than in the previous period. It should be noted however that the amount added to stocks during the second period of nine months was less than one-third of that in the first. Consumption in January to September, 1928, was 33,000,000 lb. and the amount added to stock 1,500,000 lb. and in October, 1928, to June, 1929, consumption was 32,700,000 lb. and the amount added to stock 500,000 lb. Moreover, in the second period the British-produced proportion of the home consumption had increased considerably, for imports fell from 2,000,000 lb. to 1,500,000 lb. It can be argued, however, in favor of the earlier period that exports were considerably larger amounting to 8,500,000 lb. against 7,700,000 lb. in the later period.

It should be noted in this connection that much of the yarn exported during the two middle quarters of 1928 was of very inferior quality, and it is fortunate that much less of this type of yarn, which is quite uneconomic to make, is being turned out by our smaller producers. The cotton stoppage in Lancashire may possibly have affected the consumption for the third quarter of the yarn, but as it continued only less than a month it is not likely to have seriously affected the stock position.

Demand for Fine Filaments

During all this period of price-cutting and overproduction of low-grade yarns, business in the good qualities, especially yarns of fine and super-fine filament, has continued to expand. Moreover, there was one period during the summer months of this year when



British Production and Sales of Rayon 1927-1929

high-grade yarns were considerably shorter in supply than demand, and producers became very much behind with delivery. More especially so was this the case with warp yarns in acetate rayon. The tendency seems to be for producers in a position to do so to concentrate more and more attention on fine filament yarns and yarns of special luster whether in viscose or acetate. The chairman of Harbens, Ltd., the third largest producer of viscose rayon, said at the recent annual meeting that the firm was paying more and more attention to the production of fine filament yarns, and found that it was difficult to make a profit on standard quality yarns.

It must not be imagined, however, that the consumption of ordinary grade yarns is not expanding. In recent months there has been an exceedingly large demand, especially in the Lancashire cotton trade, for ordinary quality 150 denier weft yarns. Whether this has been produced by the large companies or the small, much has been sold at very low prices and the tendency has been to place price as the most important factor. It is therefore probable that in the near future there will not be such large quantities available at very low prices.

Dress Trade a Large User

The exceedingly large consumption in the second quarter of the year, already mentioned in connection with the table, was due to a very good summer demand in both woven and knitted fabrics. The summer dress goods trade among both Lancashire and Yorkshire firms proved to be a record season a previously mentioned. The main feature was as in other countries, the remarkable increase in the demand for all-rayon fabrics. Taffetas, satins and crepes—and to a lesser degree ninons

and voiles—provided an exceptionally large business both in plain and printed ranges, and it was obvious that more yarn would be required than in other years as these fabrics were to a large extent displacing the half-cotton taffeta structure fabrics. Especially in Yorkshire, manufacturers were at one period considerably behind with deliveries, but this was partly due to shortage of yarn. Meanwhile Switzerland, Germany and various other European countries, have continued to send in more 100% rayon fabrics, and imports amounted in the first seven months of the year to £242,840 against £171,648 last year and £100,926 in 1927.

As in the case of yarn producers, business among the weavers and merchants has not been entirely favorable. In the same way the firms who have been weaving rayon for some years have concentrated on quality and have foun dtheir sales steadily expanding. There are, however, a large number of firms, both weavers and merchants, who have entered the rayon industry with very little experience, and tried to make quick profits. The results has been a large quantity of cheap-grade rayons on the market, and competition and price cutting has been exceedingly keen. This is certainly not in the best interests of the industry as the fabrics are of unsatisfactory quality and tend to turn the public against rayon. In recent months however this tendency has been less severe and some of the worst offenders in this connection have now left the trade.

Temporary Export Decline

There has been a marked decline in the total yardage of rayon and cotton mixture piece goods exported during the first six months of the current year when compared with the corresponding period of last year. This at first sight seems as if the British manufacturers were definitely losing ground, especially in view of the fact that business has hitherto steadily increased. There are, however, various factors of a more or less temporary nature which have reacted against our export trade.

A brief study of the figures shows that in the high quality trade where fabrics containing a large percentage of rayon form the bulk of the orders, business has continued to expand. This is largely the reason why there is no noticeable decline in yarn consumption as a result of the decrease in piece goods exports. In the first six months of the year, exports of cotton and rayon mixture piece goods amounted to 40,477,707 sq.yd., which compares with 49,817,795 sq.yd. in the corresponding period last year and 31,899,055 sq.yd. in 1927. The largest decline has been in the Eastern markets such as India, China and the Dutch East Indies, and these account for practically the whole of the 9,000,000 sq.yd. loss. General economic conditions have been to a marked extent against rayon in these markets, but an even more important factor has been the competition from Italian and other foreign manufacturers.

Owing to the world market slump and overproduction of rayon at the end of 1928 and beginning of this year, the Italian weavers were able to obtain yarns at hopelessly cut prices and so turn out fabrics with which Lancashire could not compete. This position is gradually righting itself, and the formation of the Italian Convention is certainly in Lancashire's favor. There was also a very substantial decline in British trade with Brazil, but this again was only a temporary phase owing to the market becoming hopelessly overstocked prior to the increase in the duty in February. Australia is, however, over 1,000,000 sq.yd. larger than last year and expansion is shown in the case of Canada, New Zealand and various other markets.

Progress in Knit Goods

During the year very good business has been done in the rayon hosiery and underwear trades, and the consumption of rayon has gradually increased. With the cheaper prices of yarn, and a similar decline in value of real silk, rayon hose have been sold exceedingly cheaply and it has only been the large turnover that has made profits possible. There has been a good business in the higher qualities made from fine and super fine filament yarns. Competition in underwear has been less severe, and business has been especially good in ladderproof fabrics and the new ribbed fabrics. Acetate rayon has been in big demand for warp loom fabrics. The wool mixture half hose trade is making slow but steady progress. There is an expanding demand for all-rayon and wool and rayon mixture outerwear, both for the home trade and for the Colonies. Rayon and mixture lace for dress, for underwear and for curtains has enjoyed uninterrupted prosperity for the last 12 months, and the prospects for the autumn are decidedly good. The import duty on lace, however, is to be removed by the new Government in June next year, and there are some manufacturers who think that this will considerably handicap trade.

Few New Companies

During the period under review there have been very few new companies formed. This has been due largely to the fact that the Stock Exchange has almost entirely lost confidence in new rayon issues, after the unfortunate experiences of some of the companies formed in recent years.

Early this year, however, the Atlas Co. was floated. The company owns the British rights to the "Brandwood" patents. British-Netherlands is the only other new company actually floated during the last 12 months. This company is equipping a factory at Wigton for the production of 20 tons per week of viscose rayon. Portman Textiles, Ltd., has been registered but it is not known whether the company intends to make a public issue or not. A plant is to be built at Banbridge, County Down, Northern Ireland, and the company is to work a new process with interesting possibilities. This process involves the use of flax waste and peat as raw materials. The inventor is Dr. Dinshaw Nanji who has spent a great deal of time in cellulose research and has brought out patents for the production of rayon from bamboo.

Subsidiaries of Foreign Firms

During the year the British Bemberg Co. and the British Breda Co. have secured sites for their proposed plants. The Bemberg Co. are building three extensive units at Wheatley near Doncaster. The first unit will have a capacity of 4,000,000 lb. per annum and when fully working the establishment will be producing over 12,000,000 lb. per annum. The British Breda Co., in addition to taking over the British Visada plant at Littleborough which is run by its subsidiary company Breda-Visada, and is eventually to have a production of 3,000,000 lb., is equipping a large existing plant at Selby in Yorkshire. Production is to be very large though no details are available.

These subsidiaries of foreign groups are likely to play an increasingly important part in the development of the British industry. Already the British Enka Co. of Aintree is turning out 40 tons of rayon per week and is the second largest viscose producer in the country. In view of recent developments on the Continent, i.e., the amalgamation of Breda and Enka, and the subsequent merging of the latter into the Glanzstoff group by the formation of the General Artificial Silk Union, the three British companies are very nearly related to one another. It will also be interesting to notice, in view of these cartelization developments, whether these companies will continue to act in direct competition with Courtaulds. In addition to the attraction of the British market there is little doubt that these companies were floated with the object of taking advantage of the British preferential tariffs in the British Dominions. Australia and New Zealand are particularly attractive.

The Outlook

The immediate future, at least for the stronger of the British companies, is distinctly bright as far as can be foreseen, and weavers and knitters have reason to look to the autumn and spring trade with every degree of confidence. There is, however, one possible event which is on the minds of most of the rayon producers at present and which may have considerable effect on the industry. I refer to the possibility of the repeal of some or all of the present duties on silk and rayon.

These, as is well known, were imposed by the Conservative Government in 1925 and the present Labor Government holds opposite views on the question of protection. The large flow of imports which would inevitably result would naturally be a very severe handicap to many producers. There are, however, many firms who believe that the Government will leave well enough alone. Nevertheless a very considerable degree of anxiety exists among rayon producers, and Samuel Courtauld had some interesting remarks to make upon the subject at the annual meeting. We cannot do better than quote him . . . "In my opinion the withdrawal of the measure of protection afforded to all branches of this greatly expanded industry would be a first-class calamity from the point of view of all those engaged in it to day. We, with our unequalled resources, would certainly put up a stiff fight against foreign competition, but I sincerely believe that there are many who would go under. . . . The average wages in the rayon industry in the three largest producing countries on the Continent are from 40 to 60% lower than ours in England . . . Unless there were compensations at home we should be compelled to take into account such an advantage offered by manufacture on the Continent, etc."

One naturally wonders whether the agreements which Courtaulds and the three foreign subsidiaries in this country have with producers on the Continent would stand them in good stead on the question of imports. In view of the trouble which has lately risen in Germany on a similar question, however, this seems rather unlikely. One thing certain—the other producers would be far worse placed than Courtaulds. Provided the fabric duty was also abolished it seems as if any advantage weavers and knitters might gain by getting their yarns cheaper would be more than counter-balanced in increased competition in fabrics. Whether the duty was a good thing to start with is questionable, but it is certain that abolition at this stage would be in anything but the best interests of the industry.

Pioneers in Synthetic Fibers

(Continued from page 92)

war, the most logical use for the great plant was the manufacture of cellulose acetate fibers for textiles. After a large amount of work, which was accomplished in a comparatively short time, Celanese was on the market in its present form.

Viscose, Last but Largest

Last to be developed, but most widely used of all the rayons, came that made by the viscose process. The chemical reactions by which it is produced were discovered by the British investigators, C. F. Cross, E. J. Bevan and C. Beadle in 1891, and patented in the next year. Thus it has very little history outside of the development of many technical details during the experimental years.

Here, again, the new material was proposed for lamp filaments as well as various other purposes. C. H. Stern and C. F. Topham, whose names rank in importance with those of the actual discoverers of viscose, were so successful in their work for the Zurich Lamp Co., that a syndicate was formed for the development of viscose as a textile.

One essential step, the ageing of viscose, was discovered accidentally through unavoidable inattention to experiments.

Another development, the brilliant invention of the centrifugal spinning box, still widely used, was a timely solution of the main difficulties being encountered.

In manufacturing or using rayon, there is always some tangled or broken material that can be cut into short lengths and made into spun yarns. Related to it, although usually claimed to be quite distinct, is staple fiber, actually made of the same materials but purposely produced in short lengths. It achieved some prominence in Germany during the war and is still somewhat slowly working its way into the textile industry.

Artificial hair, or horsehair, was one of the early forms of synthetic fiber, and was quite likely suggested by the large filaments that were made for electric lights. It developed somewhat slowly, but its qualities and advantages have found for it a field of usefulness.

Artificial tulle and laces, "cast" whole from viscose are possibilities, while straw-like products and other decorative forms are finding use in the millinery trade.

Even omitting these less important developments, most of the history of synthetic fibers is, perhaps, still in the future. With busy research laboratories in all of the manufacturing countries, and the continually arriving improvements, such as fine filaments, hollow filaments, subdued luster, and yarns strong enough for sewing thread, one can hardly venture to predict where the development will stop.

The United States manufacturer must inevitably be giving more and more consideration to the potentialities of the various export markets for rayon and mixture fabrics, and as production increases it is to be anticipated that still greater efforts will be made to obtain a large share of the trade in foreign countries. In the accompanying article an effort has been made to present to TEXTILE WORLD readers a brief summary of the present position.

Possibilities for American Rayon and Mixture Piece Goods Abroad

An Analysis of the Situation in the Various Foreign Markets

SPECIAL TO TEXTILE WORLD

MANCHESTER, ENGLAND.

IT IS noticeable that whereas rayon was at first used largely as a decoration, it is now used in increasing proportions and British experience shows that demand is very largely for mixture fabrics containing from 40-50% of rayon. Speaking generally, the higher the purchasing power of the peoples, the greater the proportion of rayon used. This general statement, however, is qualified by the incidence of tariffs which in a number of cases render trade in fabrics with a large percentage of rayon virtually an impossibility.

In a preliminary article on this subject published in TEXTILE WORLD in the spring of last year, emphasis was laid upon the advantages which the American manufacturer had in entering the world market and these advantages which arise very largely from the prominence given to American goods through the movies, the radio, the gramophone and the automobile, are appreciated by competitors. These moving advertisements of a country's products cannot fail to assist the development of the national trade in textile goods. They are a basis which, as pointed out in our previous article, the American manufacturer can safely build upon.

Interesting statistics in regard to the trade in rayon and mixture fabrics are contained in the accompanying tables.

South America Best

The South American countries are obviously the markets in which the American exporter of rayon piece goods has the best chance. The Argentine is perhaps the most promising as it is more nearly European in demand than any of the other countries. The trade in rayon piece goods, however, has been greatly restricted during the last few years through competition with real silk piece goods which are smuggled into the country in very large quantities. The Argentine is essentially a quality market, which is encouraging to the United States exporter. Britain has recently made considerable progress

BRITISH EXPORTS OF COTTON AND RAYON FABRICS TO VARIOUS DESTINATIONS

Destination	Jan.-June, 1929 Sq. Yds.	July-Dec., 1928 Sq. Yds.	Jan.-June, 1928 Sq. Yds.	Jan.-June, 1927 Sq. Yds.	Jan.-June, 1926 Sq. Yds.
India	7,776,323	8,032,628	12,668,907	7,979,479	8,148,479
Canada	5,575,411	4,196,746	5,366,370	3,531,870	2,243,226
Brazil	3,780,830	8,397,710	5,934,022	1,781,228	879,857
Australia	3,398,973	3,815,010	2,389,294	1,814,454	1,521,252
Dutch East Indies	2,014,921	2,806,328	3,776,565	2,185,591	1,294,895
Egypt	1,433,187	1,895,320	1,866,007	1,230,475	1,138,962
British S. Africa	1,258,662	3,839,616	1,576,676	634,727	646,094
British W. Africa	1,212,606	1,703,467	1,106,759	1,159,233	657,001
China	1,062,392	1,120,549	1,097,729	1,667,359	1,044,080
New Zealand	959,896	1,816,984	618,169	384,665	236,788
Netherlands	690,120	448,044	497,626	323,808	720,016
Colombia	675,056	987,754	772,909	937,386	879,598
Venezuela	655,139	443,082	304,056	474,477	808,952
Central America	501,386	1,242,642	986,053	833,243	862,762

IMPORTS OF COTTON-RAYONS INTO INDIA

From	Year Ended March, 1929 Thous. Yds.	Year Ended March, 1928 Thous. Yds.	Year Ended March, 1927 Thous. Yds.
Italy	17,805	16,022	13,901
Britain	12,619	14,263	16,079
Switzerland	7,048	11,055	6,698
Germany	2,525	4,695	2,488
Austria	2,501	3,413	.....
Belgium	855	757	980
Total (all countries)	49,801	53,141	41,978

ANALYSIS OF BRITISH EXPORTS TO ALL MARKETS

Percentage By Weight of Rayon Content	Jan.-June, 1929 Lbs.	Jan.-June, 1929 Sq. Yds.	Jan.-June, 1928 Lbs.	Jan.-June, 1928 Sq. Yds.
Under 5%	142,924	1,032,242	251,158	1,553,687
5% and under 10%	564,354	4,843,062	731,235	5,155,887
10% and under 15%	472,230	3,075,331	670,284	4,336,876
15% and under 20%	372,679	2,555,303	531,005	3,892,901
20% and under 30%	455,106	3,287,667	635,165	4,764,713
30% and under 40%	563,016	3,201,291	919,793	5,496,409
40% and under 50%	2,102,311	12,439,391	2,270,352	14,080,435
50% and under 60%	1,090,553	6,670,733	1,136,975	7,435,050
60% and over	527,459	3,372,687	463,347	3,101,837
Total	6,290,643	40,477,707	7,609,314	49,817,795

in cotton and rayon poplins, limbrics, twills and zephyrs at the expense of Italy. In yarns, however, Germany and Holland are the leading suppliers. The large amount of American capital invested in this country together with the proximity, which is such an advantage in giving quick delivery, should be a big help in developing this market for rayon goods.

In Brazil a very large trade in rayon and cotton piece goods has been done by Britain during the past two years. There is an enormous potential demand, and it is the common belief in Manchester, that but for high tariff restrictions the consumption of rayon goods in that market would be higher per capita than in any other country. In imposing heavy tariffs, however, the Government is influenced by a comparatively small number of São Paulo manufacturers who at present are not equipped to compete in either quality or price with the rayon piece goods sent from Britain or elsewhere. At the beginning of this year very heavy dumping took place, by British manufacturers, prior to the imposition of higher duties, which came into force in April. This resulted in the market becoming hopelessly overstocked and since then business has been exceedingly small. It is, however, anticipated that when the market recovers from the stock position, the new tariffs will not prove by any means an insurmountable obstacle. There should certainly be a good opening for American fabrics, which would hold their own with European goods for quality. As in all-cotton goods, rayon mixtures have to be specially constructed to comply with the tariff regulations. The best British lines for this market are what are known as end and end brocades. The other South American markets offer considerable possibilities, but in most cases rayon is classified for duty at an excessively high rate.

African Markets

Attention must next be turned to the great African markets. In East and West Africa there is already a big demand for rayon fabrics, and the high lustre of rayon has attracted considerable attention to fabrics containing a high percentage of the synthetic fiber. The potentialities of these markets are as yet untapped. Competition must inevitably be keen, but there would appear to be room for considerable development. There is, moreover, not much likelihood of home competition for a good many years to come. In East Africa, most of the rayon goods come from Germany, Britain and Holland. On the West coast, Italian, British and German piece goods dominate. The purchasing power of these markets is increasing rapidly, and there is already a quality market in which the United States might take a share.

South Africa provides a very big demand for high quality cotton and rayon and silk and rayon piece goods. The people are distinctly biased in favor of British goods, and these comprise the bulk of the imports. In the same way, a certain tie between South Africa and Holland exists, and the latter country takes second place. The demand in this market is likely to expand considerably during the next few years, and there will probably be good openings for American goods.

In Egypt there is considerable competition in the cheaper classes of fabrics, and Italy is the leading supplier. There is, however, a growing demand for fine cotton voiles with broad artificial silk bars, and Britain has at present the advantage in these lines. There is a possible opening here for American exporters, but the distance is rather a disadvantage, and the profit margin is probably small.

Oriental Outlets

In the great Eastern markets, though demand for rayon piece goods is expanding enormously, competition is extremely severe, and at present the business is not as a rule of a high enough class to attract the United States manufacturer. A large business in China is probably out of the question for the United States manufacturer. During the last 12 months or so, despite a decline in the total yardage, Japan has shot ahead and is now easily the most important supplier, even though there has been a boycott on Japanese goods.

Another important factor is the production of the Shanghai mills, as may be realized from the fact that during 1928 China imported over 12 million pounds of rayon yarns.

India is another market of great potentialities, but here again competition is increasingly severe. There is, however, gradually growing up a demand for high quality fabrics which is being met at present by Britain, Switzerland and Germany. Italy has now passed Britain in yardage, though this country is catering for the cheaper end of the trade, in which rayon is used in smaller percentages. Japan has not yet entered this market seriously so far as rayon goods are concerned, though she is certain to do so in the near future. The local mills in the Bombay area are using increasing quantities of rayon yarn, which is now imported at a lower rate of duty. They are gradually improving the quality of the fabrics, and will probably be able to compete with Italy in the near future. The demand for rayon and cotton mixtures from both India and China is of a very varied character, but as yet rayon is chiefly used for decorative purposes.

Canadian Market

The Canadian market offers considerable possibilities to the American manufacturer. At present Britain is responsible for nearly two thirds of the total imports of rayon piece goods; Switzerland is the second largest supplier, and the United States the third. Canada is, however, making a bold bid to manufacture for herself the type of goods which at present come from Britain, and a dumping duty on British cotton and rayon piece goods is at present under discussion. Simultaneous with this proposal, it was decided that British cotton yarns of 2/80's and finer (not made in Canada) should be allowed into Canada duty free. (2/80's cotton yarns are freely used in conjunction with rayon.) The friendly relations between the States and Canada, together with the fact that the two countries are adjacent, should be important features in developing the already substantial trade in rayon piece goods.

Demand in Australia

The demand for rayon in Australia is at a very high level, and it is moreover for very high quality goods. Tariffs are, however, large, and preference is given to British goods. American manufacturers would, however, be able to more successfully compete with European countries than in many other markets, as quality counts much more than price. As in Canada, demand is largely for dress goods, shirtings, linings and furnishing fabrics. The import trade is to some extent handicapped by the fact that silk is charged a lower import duty than rayon.

Commercial Development *of the* Various Rayon Processes

IT IS usual to divide the rayon production systems into four standard groups viz. viscose, acetate, cuprammonium and nitro-cellulose. Today, these have not been added to but as time passes the individual processes which may be included in these larger sections of the industry are gradually becoming more prominent. In some cases the commercial development has reached a very important point; in others there are even yet only pointers to show on what lines the inventors intend to work.

Experience has shown, that in rayon as in other industries, the inventor of the process is usually, though not by any means always, devoid of knowledge of the intricacies of finance and in some cases he has been compelled to turn to financiers who were looking for immediate gain rather than to the advancement of the industry as a whole.

So many modifications of the four basic processes of manufacturing rayon have been developed and promoted during recent years, particularly abroad, that confusion has developed in the minds of many who follow this industry. The author of the attached article has attempted to "clear the air" by summarizing the modified processes which have acquired commercial significance.

We have experienced during the last few years on the other hand the promotion of companies with the object of developing patents which the financial houses could not possibly judge. They have realized that the public was prepared to put up money in almost unlimited amounts, and on the flimsiest of pretexts companies have been formed to develop processes which any sound technical man might have known could not be brought to fruition for many years. Out of all this welter, however, the sounder methods of production are showing themselves and the aim of this article is to explain as briefly and as concisely as possible the commercial development of the more prominent of the processes now before the trade.

Developments in Acetate

It is possible that invention has been concentrated almost as much on the acetate side of the industry as on any other. This is true of the last few years at least and as a consequence we have a number of sub-processes which are now coming to light. It is probably true that the first acetate rayon was made by Bayer and Co., or by Eichengrun and their chemists in Germany but the development of the industry undoubtedly was left to the Dreyfus brothers who formed the British Celanese Co.

The history of the distribution of the patent rights of this company is a most interesting one and owing to litigation and other reasons, they have been constantly before the public. The first main line of development of the processes is that through the Belgian Tubize Co., which works the patents in Belgium and which, through a complicated agreement which has been unsuccessfully attacked many times in the courts, has the rights for the leading European countries. The rights have been exercised in France only where a large and successful company known as the Soie Francaise de Tubize has been established. The terms of the agreement with British Celanese, or more accurately with the Dreyfus-Clavel group, provided that the working of the patents in Italy should be in the hands of the French Tubize Co., and within quite recent times, the Italian Tubize Co., has been formed and is engaged upon the erection of a plant in Italy where the Celanese patents will be used.

The development of the process in Germany and most of Central Europe has been retarded for the aforementioned reasons. In the American direction, the British Celanese interests established what is now known as the Celanese Corp. of America and in Canada the Canadian Celanese, Ltd., has made a promising start. There is a possibility of the establishment of an Australian subsidiary.

Another major set of acetate rayon patents comprises those originated by the American Miles. They are used, at least in part, by Courtaulds Ltd., who after a very successful run in the viscose field decided, largely as a result of the demands made upon them by their own customers, to establish an acetate plant at Coventry Eng. This plant was subsequently increased and while the firm is very guarded so far as release of production data is concerned, it may be said that the output is large and a by no means unimportant factor in British production. These patents are to be used by The Viscose Co. in America, which is completing a plant in the States.

Another interesting set of acetate rayon patents which, though not tried out on a very large scale as yet, have considerable possibilities, are those of the Syntheta A.G. in Basle, Switzerland. A plant was built in Basle and has for some considerable time been turning out large experimental quantities of rayon. This has proved to be of good quality and has attracted the interest of important parties. The French rights were secured by an English group known as the International Artificial Silk Co., which is now turning out, according to recent reports, about 500 kilos per day at a plant at Clairoix.

Subsequently, a subsidiary of the International Artificial Silk Co., known as the Alliance Artificial Silk Co., was formed to acquire the British and the American rights. Alliance is just starting production on a small scale at its new plant at Lowestoft, Eng., but up to the present has not completed arrangements for the development of the United States rights which are naturally regarded with considerable interest.

In another direction the Syntheta company sold its process rights for Switzerland to the Swiss Lonza Co.

About this time the Lonza company changed its name from the Lonza Power Co. to the Lonza Electrical and Chemical Co., and made a very important agreement, the terms of which were never fully disclosed, with the Dutch Enka Co. Subsequently a company was formed in Holland in which the Lonza and the Enka companies had joint interests. The future is not very clear. It is probable that Lonza will erect a plant in Switzerland in which both raw acetate and rayon will be produced. On the other hand they may in addition erect a complete unit in Holland in conjunction with Enka or it is possible that they will merely sell the raw acetate to the Enka company. So far as the commercial development of the process in Germany is concerned, interesting rumors associate this with the name of Glanzstoff, but nothing official is known.

The acetate rayon patents invented by Dr. Levy have not as yet met with much commercial success. They are being used by the Apex Artificial Silk Co. in England, however, and the output has now reached over two tons per week. The company owns the foreign and colonial rights.

Certain patents rights based on the original work of Dr. Eichengrun and owned largely by Sir William Bulmer have been taken over by the British Acetate Silk Corp. but so far the commercial results are not known, and the development of the world rights will no doubt follow in due course. This company has also acquired certain interests in the "Suida" and "Wacker" processes for which considerable claims have been made regarding the cost of producing the raw acetate. The "Suida" process is used in Germany by the I. G. Farbenindustrie, in Belgium by the Tubzie, Artificial Silk Co., in France by the Societe des Produits Chimiques du Bois and Societe des Produits Pyroligneux, in Spain by the S.Y. "Arana" Wood Distilleries, and in Poland by the Zaklady Chemical Works. The patents rights which involve processes for the production of acetic acid and the recovery of weak acids are owned in Yugo-Slavia by the recently formed Chemical and Wood Industries Ltd., of London, which controls the licensing of the process in other countries.

Certain acetate rayon processes are also to be used by the Cellulose Acetate Silk Co., which has built a plant at Lancaster, Eng., where raw acetate is now being produced in considerable quantities. Little as yet is known as to the commercial future of these processes, however.

One of the most interesting of all the acetate processes and one which has now reached an important stage of development is that worked by the French Rhodiaseta Co. in conjunction with the chemical firm the Usines du Rhone. This company is now producing nearly 2,000,000 lb. yearly and is continually extending. The German rights have been acquired by the German Rhodiaseta Co., and within the last few weeks it has been announced that the Swiss Rhodiaseta Co. has been formed with the aid of the parent company. The American rights are in the hands of the du Pont Rayon Co. and from time to time, there are rumors regarding the process in Britain. Thus far, however, nothing authentic is known. There is also an Italian Rhodiaseta Co., which is now erecting a plant and in which the Nonteeatini Chemical Co. is interested.

Another French process for the production of acetate rayon is that to be worked by the Setyle Francaise which has been formed by the Bozel-Maletra interests. An associated company known as Setyl Italiana is also to work this process in Italy.

Pending the production of acetate rayon on a commercial scale by the German Rhodiaseta Co., the only important representative in Germany is the Aceta A.G., a company formed by Glanzstoff and the I.G. The company met with a long series of difficulties but it is said that 1,500 kilos. daily are now being produced. The I. G. Farbenindustrie themselves do not appear to have done very much in the production of actual acetate rayon though their pioneer efforts and their assistance on the chemical side are well known.

Another of the major acetate rayon patents in Europe is the Ruth-Alder group used by the Italian Soie de Chatillon and now by the American Chatillon Corp. and the new American Acetate Silk Co. in the United States. It is intended to exploit these patents in various European countries and this will apparently be done by the American companies. So far no official information has been vouchsafed but it is said that among the companies which have given consideration to the proposals is the Branston Artificial Silk Co. in England.

Smaller acetate developments include those of Heberlein with the Nova Seta A.G. in Switzerland, and Zdanowich—also in Switzerland. In the latter case the company utilizing the patents, viz. Tessilia, has been taken over by the Lonza-Enka group previously referred to.

The Viscose Process

Turning to the viscose process, in this case patent rights in many cases have expired. Therefore, there is little reason why new companies need to adopt any particular process and the vast majority of companies consequently will not enter into our survey which is intended to show the commercial development of particular patents and not of processes in general. It should be fully understood, therefore, that the remarks which follow do not have any reference to those patents used by the vast majority of firms. It may also be explained that most of the processes here mentioned are those of potential value rather than of practical importance from a profit making point of view at the moment.

A group of patents, the commercial development of which has been delayed for many years, are those known as "Lampose" and owned by the Soiries de Strassbourg which until his death was managed by the late Emile Bronnert. An interesting development of the process in recent months has been the formation of the Soiries de Ninove in Brussels. This company has a capital of 70,000,000 francs and has secured not only the "Lampose" patents for Belgium but the rights for Poland, Holland, England, Ireland, Canada, British India, South America and China. In view of the steadily growing production in France the posibilities of a world wide development are now much brighter. The process is used by the Skenandoa Rayon Co. in the United States and by certain other European interests. It is understood that these include an extensive scheme for the development of the process in Russia.

The French process known as "Girard-Petit" is now to be developed on a large scale by Anglo-French (Verdun) Artificial Silk Ltd., a British company with a capital of £500,000 formed last year. The company intends to produce from four to five tons of viscose rayon per day at its plant at Verdun.

Perhaps the process which has excited the most comment in recent months is the "Brandwood" the claims for which are now fairly well known, though the commercial development can scarcely have said to have

really begun. The British rights are held by Atlas Artificial Silk Processes Ltd., which is really a subsidiary of the International Artificial Silk Co., already mentioned when dealing with the exploitation of acetate patents. The Empire rights of Canada are held by Atlas, which has also a half interest in the rights for the United States and Canada and many other countries. The International Artificial Silk Co. holds the rights for France. The process is now being tried out commercially by Atlas at its plant at Littleborough in Lancashire and machinery is also almost completely installed ready for production at the International Artificial Silk Co.'s Aubenton factory in France. If the English and French trials prove successful, the sales of foreign rights will be a matter of the greatest interest.

In the viscose process mention must be made of the well-known "Alsa" hollow filament patents over which there has been long and costly litigation on the part of Courtaulds, Ltd. These patents are used in almost every country and have excited the greatest interest being now far past the experimental stage. In France this hollow filament silk is made by La Soc. Francaise de la Viscose at Arques-la-Bataille and by the Soie Artificielle de Gauchy. In Britain the firm of Kemil Ltd., uses the patents, while in Germany the Deutsche Celta A.G. has been expressly formed for the purpose by the Glanzstoff Co., and is now turning out large quantities. La Supertessile in Italy also makes hollow filament, while in the United States, the Du Pont Rayon Co. is understood to be going rapidly ahead. In Belgium the process is also used.

Among the other prominent processes to be dealt with under this section is that known the world over as "Lilienfeld" representing the patents taken out by Dr. Leon Lilienfeld of Vienna. On account of the greater strength of the yarn produced by this process it has attracted very considerable attention. The process was first adopted by the Nuera Artsilk Co. in Britain and was subsequently taken up by Courtaulds, Glanzstoff, and The Viscose Co. The development is proceeding steadily and though there have been some delays and while it is understood that the cost of production is rather high, there is reason to believe that this process, or subsequent developments of it, may have a profound effect upon the industry.

The Sindl-Maurer process of viscose rayon production adopted also by the Nuera company, has some interesting points, but in view of the slackness in demand for ordinary viscose is not in much favor at the moment and it is being slowly dropped by the Nuera company, in favor of "Lilienfeld." It is understood that the Maurer process may be used at least in part by the new Soie de Farnier in France, but of this company little is known.

A process, the aims of which are somewhat on the same lines as "Brandwood," is the Borvisk. These patents have been in existence for a number of years though financial difficulties have limited success. The German Borvisk Co. has a plant at Herzberg, the French Borvisk has been absorbed by large chemical interests and the Polish Borvisk has not yet started to produce. The Swiss Borvisk Co. has been taken over by the Steckborn Artificial Silk Co. There are two "Borvisk" holding companies in the United States.

Cuprammonium Developments

The cuprammonium process is now virtually in the hands of one firm so far as world production is concerned. The German Bemberg company has its subsidiary, the American Bemberg Corp., and in France they have the Cupro-Textile; in Britain there is the new British Bemberg Co., and in Japan there is the Japan Bemberg Co. Italy is represented by the Seta Bemberg. The only other cupra firm of importance is Kuttners, who it is reported have recently decided to extend their activities to France.

The Nitro-Cellulose Process

The nitro-cellulose process is of limited importance, from the standpoint of output, though such firms as Magyar in Hungary, (represented in New York by Geo. Elbogen & Co.) Tubize and others in Belgium, and most important of all the Tubize Artificial Silk Co. of America, still make large quantities. It is significant, however, that the Belgian Tubize Co., is now reducing its production or at least stopping all plans for increasing. Costs of production vary in the different countries in a very marked degree.

A New Process

A new process, the commercial development of which has not yet commenced, is known as Butyrocellulose and will probably be used by a Franco-German company largely controlled by Oscar Kohorn & Co. of Chemnitz, and Le Franc of Paris. The treatment of cellulose with butyric acid is the fundamental principle but little is as yet known.

Japan's Position in Rayon Market

India's Importations also Give Prominence to Italy, England and Switzerland

The importance of Japan as an exporter of rayon piece goods has been brought home to every merchant by the latest Indian import returns. The latter refer to the quarter ended June 30, 1929, and it is disclosed that Japan is now the leading supplier of rayon mixture fabrics and that out of a total importation of 11,174,965 yds. in the quarter, no less than 3,366,163 yds. came from Japan. The position is shown graphically in the following table of Indian imports in the second quarter of the last three years:

INDIAN IMPORTS OF RAYON MIXTURE FABRICS

From	1927 Yards	1928 Yards	1929 Yards
United Kingdom	2,474,638	5,062,554	2,006,778
Germany	972,343	910,811	220,969
Belgium	39,201	67,676	77,087
Switzerland	2,241,903	2,420,563	1,408,621
Italy	2,447,985	4,773,716	3,148,417
Austria	308,638	954,253	509,056
Japan	93,052	279,266	3,366,163
Others	376,599	819,136	437,874
Total	8,954,359	15,287,975	11,174,965

This increase in trade with India, which has been assisted by the fact that yarns have been sold to Japanese manufacturers by British producers at absurdly low prices, is also to be noted in other markets, where unfortunately statistics are not so complete nor so up to date. In Ceylon, for example, Japanese imports of rayon manufactures which in 1927 only totalled 2,140 yds., amounted in 1928 to 138,447 yds. In the Straits, another market where Japan is making headway, imports in 1928, the first year for which figures are available, amounted to 1,117,977 yds. out of a total from all countries of 4,359,109 yds. In the Dutch East Indies, Japan has also made a start.

Expanding Use of Rayon By Broad

An

The feature of the year, in the use of rayon by broadsilk mills, was the success scored by this fiber in the transparent velvet field, says the author of this article.

In fact, the term "broadsilk mills" in this connection is somewhat of a misnomer, as all-rayon fabrics are being produced in increasing quantities by plants which formerly confined themselves to silk goods.

By John
Editorial Staff,

THE progress made thus far in 1929 toward the further expansion of the use of rayon as a fabric textile, was nowhere more noteworthy than in the broadsilk field. This industry apparently had been just waiting for competent salesmanship to show the synthetic yarns in their true value; the trade's response to recent promotional effort was impressive both in promise and performance. When 1929 opened, rayon was still regarded somewhat skeptically by the broadsilk mills. A few had offered all-rayon numbers; rayon mixtures had been quite well established through several years of merchandising; but the weavers as a whole continued to regard the newest of the fibers as a stepchild of the textile industry. "You can't beat silk." "Silk is the only proposition for fine fabrics." Such was the viewpoint of the weavers.

Recently, however, this attitude has undergone a radical change. Several of the leading broadsilk mills began to develop rayon extensively; they offered numerous and attractive all-rayon fabrics. They pushed the sale of rayon in many directions. The result showed itself in a voluminous and profitable turnover. Rayon as dress goods, rayon as coat goods, rayon even as a fabric for smart raincoats for women—these were among the recent features in rayon's development in the broadsilk industry. With the approach of 1930, indeed, it might be said that rayon has definitely entered the broadsilk field. It is no longer a new, doubtful and timidly regarded experiment, but has established its right to be taken seriously as a valuable division of the broadsilk mill's output.

Bathing Ensemble of Rayon and Silk Surah Suede in Green and Blue

Hostess Tea Gown of Rayon Transparent Velvet Worn by Given Lee, Motion Picture Star. Steamed-in Design Gives Brocaded Effect

Recognized as "Quality" Yarn

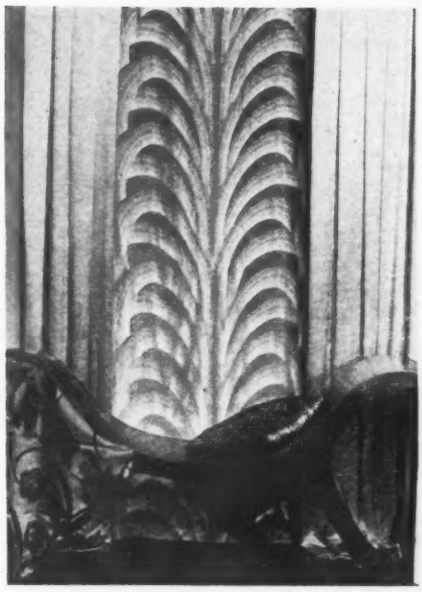
Perhaps even more important, however, has been rayon's progress toward recognition as a "quality" yarn. This, one of the most ambitious aims of the rayon producers, is now well on its way toward realization—at least, as regards woven goods. The improvement in rayon yarns, the ceaseless trend toward finer and yet finer deniers, have facilitated the problem of winning "quality" acceptance for rayon. All through the first eight months of 1929, there was one pronounced tendency in yarn sales made to the weavers, and that was the call for finer grades. When the year opened, weavers bought the 150s, 125s and a few 100s. Month by month, they turned away from the coarser yarns, and toward the finer. At present, the bulk of weaver demand is in the 100 denier class, and there also is extensive call among weavers for the 75s. These yarns are being used for the manufacture of a wide range of all-rayon fabrics. The most notable advance in recent months was in rayon crepes, flat and canton; these unweighted, yet heavy materials have won a stronger dealer and consumer acceptance.

The outstanding feature of the year, and the develop-

ad silk Mills

Outstanding Recent Development

*Black**
TEXTILE WORLD



A Low Luster Rayon Voile Embroidered with High Luster Rayon for the Long Panel and the Side Drapes of Heavy Rayon Satin

Printed Rayon Velvet Used to Advantage to Fashion This New Fall Street Dress

ment which gave the greatest encouragement to rayon producers so far as the "trading-up" movement is concerned, was the success scored by rayon in the transparent velvet field. Here, truly, the synthetic yarn won a notable victory. We can rejoice over its accomplishments in this field, even though we must also recognize one serious difficulty; namely, that rayon's vital place in the manufacture of transparent velvet has not yet been adequately "sold" to the consuming public.

Use in Transparent Velvets

The history of transparent rayon velvet is brief. This lustrous and essentially de luxe fabric first began to attract wide attention last year, when it jumped, almost overnight, into a position of importance at the sales end. Benefitting by 1928's example, the broadsilk mills began early in the current season, to develop their rayon velvet market. They bought liberally of the 100 denier, 40 filament synthetic yarn, which is the size chiefly used for making rayon velvet, and special effort was exerted to create attractive new tones and new designs. These numbers won quick and wide favor among both cutters and retail piece goods buyers. Active ordering of transparent rayon velvet fabrics began earlier than ever this year, and indications are that the mills will enjoy a handsome turnover on these numbers during the remainder of the current season.

To the rayon producer, however, the significance of rayon's acceptance in transparent velvet is something more than a source of attractive business. It marks a big step forward toward recognition of the synthetic yarn as a "quality" textile. Transparent velvet is no low-end or "price" proposition; it is essentially a Park Ave. fabric, a fabric for the social elite, for formal wear, and it is selling itself to the smartest and most style-conscious women. Offered in the delicate pastel shades, it has rare charm and distinction, together with lightness of weight, all of which qualities unite in making it adaptable to such discriminating uses as evening wraps, dinner gowns, formal afternoon dresses and luxurious draperies.

So far as production and sales are concerned, transparent rayon velvet might be said quite definitely to have arrived; and the significance of this accomplishment is brought home more strongly when it is remembered that the very first transparent rayon velvet was introduced into the American market scarcely two years ago. With respect to the consumer's attitude on rayon velvet, however, the situation is less satisfactory. It is a fact which is being brought home more and more strongly each day to the trade, that many wearers of these charming and graceful velvet garments recognize the beauty of their own apparel without realizing that rayon has become a "quality" textile.

When rayon velvet was first offered to the public, it was considered—and perhaps, indeed it was—an extremely weak fabric. Retailers sold it timidly, and with many admonitions to their customers that "it could not be guaranteed." Rayon overcome this difficulty when the laboratories developed finer and stronger yarns. Soon, the retailers began to sell it without the customary discouraging caution, and now rayon velvet has taken its place on the counters of the smartest shops, as a thorough-going quality staple.

So far so good. But still the consuming public continues in ignorance of transparent velvet's rayon content.

(Continued on page 110)

*The author acknowledges with thanks the valuable co-operation of Miss Emma Lou Fetta, publicity director of the Rayon Institute, in developing the data on which this article is based.

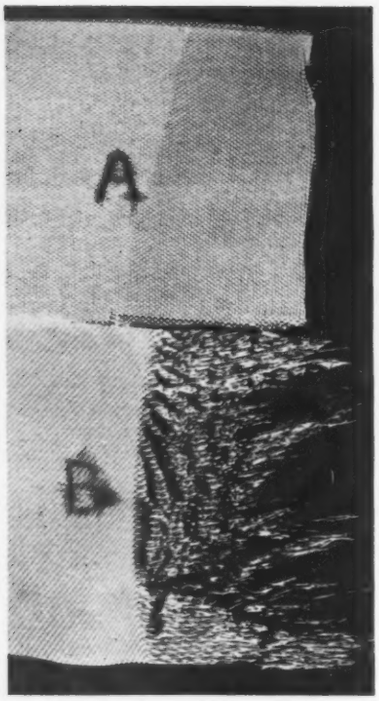


Fig. 1. Effect of Hot Ironing on Acetate Fabric; A, Partially Saponified; B, Untreated

ACETATE YARNS *in* Men's Wear Linings

The possibilities in developing fabrics made out of cellulose-acetate yarns have hardly been scratched. In this article Mr. Curtis discusses some of the new lining fabrics including serges, satins, and alpacas, presenting first-hand information on the processing of such goods.

By Raymond Curtis, M.S.C., A.I.C.*

THE last twelve months have seen a determined effort on the part of the manufacturers of acetate yarns to enter the men's wear lining field. Considering the large volume of yarn business involved it is not surprising that all the rayon manufacturers should wish to participate. But the pressure in this direction from the acetate yarns came at a time when the converter of better class linings was particularly receptive to the claims made for the newer fiber. The lining market had been flooded with the poorest quality of foreign rayon, making the word "rayon" in some quarters almost synonymous with "low-grade." To make a fabric of acetate yarn inevitably put it in a class apart from the ordinary rayon linings. Added to this, some of the properties of acetate, particularly its resistance to wetting out, stretch or shrinkage, make it a desirable fiber for linings.

However, despite this very favorable soil for the growth of the acetate business, it cannot be said that the newer fiber has made any very serious inroads into the viscose territory. The great bulk of the men's wear lining business, namely, rayon-warp and cotton-filled serges and satins, and rayon-filled alpacas, continues to utilize viscose rather than acetate. Only where the acetate has some marked advantages over the viscose fiber has the replacement of viscose been common. For instance, in the case of sleeve linings where a soft slippery "hand" is so desirable, an all-Celanese twill makes an ideal lining fabric. Similarly, where cross-dye effects are required, the special dyeing properties of acetate can be utilized, and during the past year lining fabrics of this nature have been popular.

The introduction of acetate into any fabric presents the dyer and finisher with special problems, and frequently new methods of processing must be devised in order to cope with them. One of the chief drawbacks to acetate as a lining material is that it does not withstand the tailor's hot ironing as well as viscose rayon and silk do.

*Manager, Quidnick (R. I) Dye Works, Inc.

Increasing Resistance to Hot Ironing

Fig. 1 shows a cutting (*B*) of an all-Celanese twill heated for ten seconds with a hot iron (500 degrees F.). The part under the iron melted and adhered to the metal; on withdrawing the iron the cooler plastic rayon was drawn out to a gossamer. To overcome this defect it has been found necessary to subject acetate to a partial saponification and in this way the fabric can be got to withstand ironing at a temperature of 520 degrees and over. The cutting *A* in Fig. 1 has been "ironproofed"; i. e., partially saponified, and ironed for ten seconds along with cutting *B*.

There is nothing new in the idea of saponifying acetate as this was one of the earliest methods of getting the fiber to dye by utilizing the cotton dyestuffs. But the difficulty of getting a uniform and only partial saponification was never satisfactorily solved in the case of acetate skeins. During the past twelve months the Celanese Corporation of America has from time to time issued instructions for the ironproofing of Celanese fabrics, all of which are capable of giving satisfactory results. One of the earliest recipes was as follows: "Treat the fabric in a bath having the ratio of water to goods of 130: 1 to 160: 1, at 80 degrees C., for three-quarters of an hour.

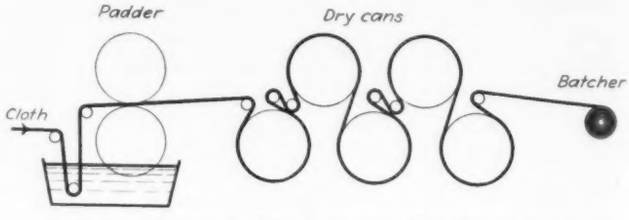


Fig. 2. Diagram of Equipment for Hot Iron-proofing

the bath containing 1 gm. of soap per liter; then lay up the goods and add 6% caustic soda on the weight of goods and continue treatment at 80 degrees for three hours."

Besides the more obvious drawbacks to any such method as this it was found that the great majority of all-Celanese fabrics could not be treated in the rope form without the formation of "rope marks," which persisted through any further processing. If such fabrics are treated open width in silk degumming tanks the cost becomes prohibitive.

The latest method recommended by the Celanese Corporation is to run the fabric through a padder, containing 13° Tw. caustic soda at room temperature, twenty yards a minute, picking up a weight of liquor equal to its own weight, and then to pass the goods immediately on to dry cans at about 70 degrees C. This is illustrated diagrammatically at Fig. 2 and is a productive method which can be successfully applied to the ironproofiing of lining fabrics. This method is the property of the Celanese Corporation of America for use on fabrics containing Celanese brand yarn.

A still simpler method, which avoids the necessity of a special plant and which is being successfully used by the writer, is to run the fabric through an American padder (11° Tw. caustic soda at 140 degrees F.) at one hundred yards a minute, picking up liquor to give 80% increase of weight. The cloth is batched up and then given two ends on the jig, through water at 170 degrees F., after which the dyeing can be carried out in the usual way. The advantages claimed for this method over the "pad and can" method are that the cloth shows less tendency to develop streakiness in dyeing and that there is no serious loss in width.

Since ironproofiing consists of the partial regeneration of cellulose it is obvious that when cross-dye effects are required in union fabrics the method cannot be applied, and consequently such fabrics require a reasonable amount of care when ironing.

The ironproofing of acetate naturally affects the affinity of such fibers for dyestuffs and this fact adds to the difficulty of dyeing. Any unevenness in the saponification treatment, whether from end to end in the batch, or in streaks, or at seams, etc., will give rise to uneven coloring and no amount of care on the part of the dyer, or re-handling of the goods, can overcome this defect. Even slight variations from batch to batch in the amount of saponification will affect the dyeing formula so that when dealing with acetate fabrics that have been ironproofed the customary "five ends on the jig and off" becomes a utopian dream. For ironproofed lining fabrics the question of a good black presents difficulty. It is not possible with S.R.S. Black IV, or Ionamine A, to get the necessary depth of shade and one must use a developed black along with the acetate black, such as Developed Black VG (Newport).

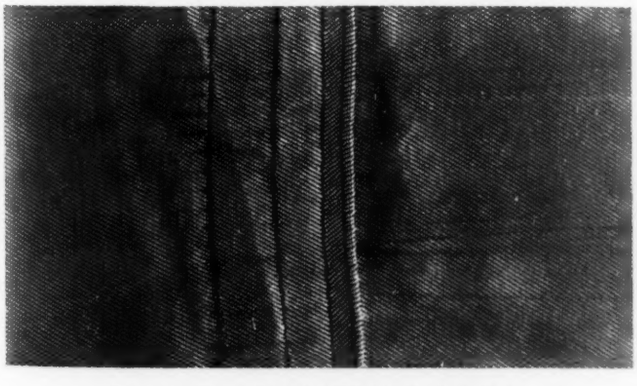


Fig. 4. Warp Streaks Which End at Seam

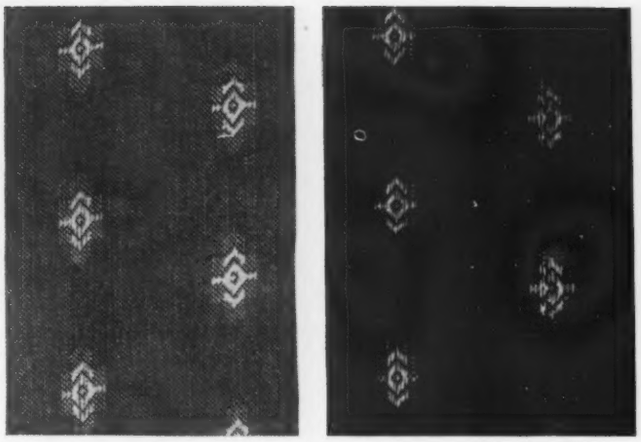


Fig. 3. Cotton-Viscose Alpacas with Acetate Decorations

Success of Sleeve Lining Twills

Of the lining fabrics made entirely of acetate, sleeve lining twills have been most successful. The goods are ironproofed and then dyed on the jig with SRA, Duranol, Ionamine or Cellit fast colors, dried and filled on the Palmer, and if necessary tentered to width and calendered. In filling any acetate fabrics there is always a danger, owing to the difficulty of wetting out, of the filler or softener riding on the surface of the cloth and giving rise to a mottled appearance.

There is not a big demand for all-rayon serges and some made from acetate have proved very difficult to process successfully. The main causes for these failures were:

(1) Faults in the construction of the cloth.

(2) The marked tendency to develop local creases and crimps when knitting on the jig.

(3) The difficulty of matching mode shades.

Examples of the first are cloths which when wet develop slack selvages to such an extent as to make it impossible for them to dye evenly on the jig. In other cases the selvages are so tight that when the cloth is wet out on the jig the selvage threads break every few yards. To insure good dyeing the cloth should run satisfactorily on the jig with practically no tension, but the tendency to develop local crimps, which most of the fabrics show, makes some tension generally necessary. Smooth running silk jigs fitted with cloth expanders have given the most satisfactory results.

It will be realized of course that for men's wear linings the bulk of the shades are grays, fawns, drabs and browns, the dyeing of which is a very different proposition from that of dyeing dress goods or underwear shades. Not only is the matching much more difficult, but the majority of the dyestuffs on these heavy cloths dye very slowly on the jigs, making full shades difficult and expensive to obtain. With some colors—an outstanding example being Ionamine Blue B—the initial strength of the bath between quite wide limits has little effect on the shade and only a prolonged dyeing (12-16 ends) will give a really heavy shade.

The dyeing of acetate rayon unions such as cotton-

rayon lining serges, satins and alpacas, does not present any special difficulties and while the alpacas may be vessel-dyed, it will generally be found that jig dyeing gives the best results.

In the case of cotton-rayon (viscose) alpacas with acetate decorations (see Fig. 3) it is very difficult to dye the ground shade without getting "print off" marks from the decoration, because both on the jig and on the padder the acetate carries dye liquor into the batch which gives up its color to the adjacent cotton or viscose, instead of the acetate. The difficulty is best overcome by padding the ground shade (which gives a level result on the cotton and viscose) and then, before batching up, run the cloth through glauber salt solution.

New Lining Fabrics

Of the newer lining fabrics, serges of viscose warp and acetate filling, and later of acetate warp with viscose filling, have been popular, particularly in cross-dye effects. The procedure is what one would expect; scour on jig (bleaching for dirty goods), jig-dye the acetate, soap off to clean the viscose and then jig-dye the viscose. As in all cross-dye work it is essential to cut down the time of dyeing to a minimum and it is important to use selected direct colors which resist acetate. Trouble is frequently experienced with the acetate warp owing to the tendency to show warp streakiness. At first glance this is not unlike warp streakiness one associates with uneven-dyeing viscose, but a closer examination shows that the streaks do not coincide exactly with the warp threads. Fig. 4 is a particularly good example taken from the middle of a batch. The piece at the top is very streaky but it will be observed that the streaks end with the seam, the adjacent piece being quite free from them. As both pieces, as far as the dyeing is concerned, had identical treatment it is obvious that the fault must be due to some difference in the greige.

It will be readily understood from what has already been written, that there is a good deal of uncertainty about the cost of processing acetate linings and in a good many instances at the present time the converter is getting something for nothing. In the case of the viscose linings the procedure has become so standardized that it is possible for the finisher to shade his price to a quarter of a cent, but there is no finisher in the trade who can take a new mill style of acetate lining and know with any degree of certainty what it is going to cost to process it. Difficulties of processing, necessitating rehandling and possible heavy loss in yardage, may be encountered at any time; while a uniform price which takes no account of the shades called for on the acetate may be way out of line.

There have been no noteworthy additions to the various series of dyestuffs for acetate for several years now, and until this state of things is remedied, it is impossible to make the progress with dyeing which the men's wear lining trade demands.

Rayon in Broadsilk Mills

(Continued from page 107)

The average woman of today buys it on the casual supposition that it is "some sort of silk." Her attitude is logical enough, perhaps, as transparent velvet is not being sold under its true colors. Neither manufacturers nor merchandisers give the synthetic textile due credit, in this field. There is no real effort made to stress the name "rayon"; in most instances, rayon is not even mentioned. This difficulty has been recognized by Ernest L. Starr, director of the Rayon Institute, who recently issued a statement urging that some concerted effort be made to tie up the word "rayon" with the merchandising of transparent velvet. It is no exaggeration to say that this issue represents one of the most important questions facing the rayon producers today, so far as winning quality recognition for their product is concerned.

Use in Other Pile Fabrics

Transparent rayon velvet is only one of the important pile fabrics in which the synthetic yarn is becoming important. There are also rayon panne velvet, and brocaded rayon velvet; and at the moment of writing there are several new developments: Semi-panne, in which alternate widths of the fabric are erect, and panne pile; then too, there is also lakme rayon velvet, a fabric of unusually long pile bearing a beautiful panne. Still one more important group calls for mention in this department, and that is the printed velvets. Printed velvets as yet are somewhat in the development stage; they enjoy a fair market demand, but their popularitiy is slight compared with that of the non-printed fabrics.

Among the lighter-weight products, satins are becoming increasingly important. In these fabrics, rayon is used on the face of the fabric, to give a lustrous effect to the design. The rayon satins range in weight from very sheer, negligee satins, sometimes two-tone, to the strongest, most lustrous, modern upholstery satins, sometimes all-rayon, and sometimes with silk or spun silk backs.

Rayon's progress in the upholstery field has been im-

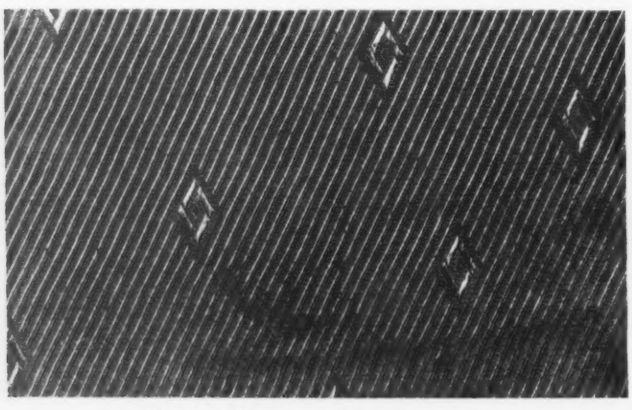


Fig. 5. All-Celanese Jacquard Fabric

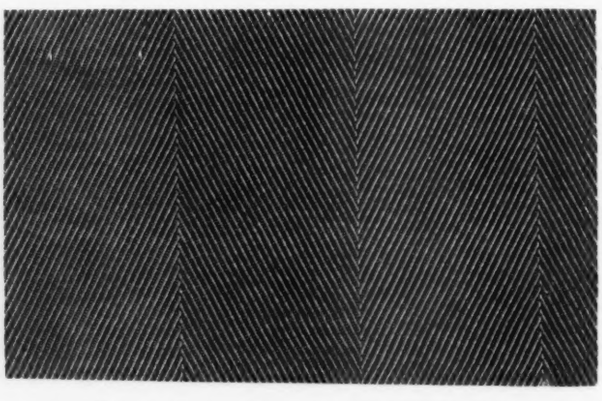


Fig. 6. Rayon Warp, Celanese-filled Twill

portant. The synthetic fiber is winning wide recognition as a base for upholstery to be used in railroad trains, automobile interiors, yacht interiors, and also airplane cabins.

Many New Uses

So far as new uses are concerned, there still remains to be recorded rayon's growing acceptance in the field of interior decoration. Much progress has been made toward the utilization of rayon for the following: Sash curtains, including sheer voiles, etc., of modern design and in new fashion-right shades; rugs; over-drapes; and lamp-shades. The synthetic fiber lends itself particularly well to the manufacture of rugs and lamp-shades. Rayon rugs for bathrooms and bedrooms and handsome reproductions of Oriental rugs for living rooms are important developments of the year, and are winning consumer approval. Rayon's entry into the lamp-shade field started last year when transparent rayon velvet was used for this purpose; however, the range has broadened and numerous rayon fabrics are being used for this purpose, among them rayon satins, taffetas, georgettes, nets and crepes.

More Rayon to Be Used in Cottons

Improvement in Yarn and Development of New Fabrics Principal Causes

TAKING into account the volume of business placed on rayon and cotton mixed fabrics during the last few months, it is a general impression that such materials are going to play a more prominent part in the wash goods business of 1930; in fact, considerably greater than for the season just closed. It was true in all mill centers last year that the consumption of rayon by cotton mills had been materially reduced and once more cotton itself took the limelight as a style medium. Judging by the trend of recent months it seems as if the consumption of rayon is once more on the ascendency especially in the fine goods mills of New Bedford.

This prediction is based on a twofold cause: First, the marked improvement in synthetic yarns, such as the multi-filament and low-luster rayons; and second, the development of the flat crepes and twills by cotton mills. Cotton manufacturers rapidly appreciated the improvements brought about by the chemical yarn producers and soon grasped the possibilities offered. The consuming trade in turn have appreciated the higher quality of goods offered in rayon mixed cloths with the result that a solid groundwork has been laid for the coming season.

There is no doubt that the trend is towards better and finer merchandise but there is the usual danger that both fabrics and construction will be degraded to put the finished goods on a price basis. There are mills, as there always will be, just barely keeping their heads above water that will try anything once. That may be a good spirit at times but has disastrous effects when it comes to trying rayon without having the necessary equipment and technical knowledge for competent handling.

New Fabrics Developed

Fabrics other than the flat crepes and twills have been recently developed and account for a good deal of the consumption of chemical fibers. The rayon pique is an item that has attracted a great deal of interest and has sold in considerable volume. Cuprammonium-filled shirtings occupy important positions in the fall lines of several converters and there is already a good mill inquiry in swing for such fabrics for spring.

Rayon has always been important in decorative fabrics but the past year has seen it included in some of the most exclusive and expensive materials. The point was finally reached where it was exhibited at the Metropolitan Museum of Art in New York City, at a showing of modern decorative art. In this field of decorative cloths many beautiful rayon mixtures have been developed for automobile upholstery and slip covers. Far from the all too frequent idea of rayon fabrics catering to the price class, the cars using this type of upholstery are almost entirely in the "blue chip" category.

From a point of yardage the flat crepe is by far the most important and is being manufactured by both cotton and silk mills in plain colors and printed patterns for dress and lingerie wear. Some of the older types of fabrics, such as the cotton and rayon satins and rayon alpacas, have shown up less favorably. The viscose process voile which was very popular a year ago has been displaced to a great extent by the better georgettes, ninons, chiffons and toiles.

The cotton section of the rayon consuming trade feels that future prospects are good but a great deal depends upon the merchandising policies of the rayon producers. It would be a serious matter if the price situation were to be disturbed again, and it is their hope and belief that a maintenance of present levels would be the wisest move. The majority of the business in the Worth St. section calls for multi-filament yarns and it is probable that there is an excess supply of the old type yarns such as were used in the original rayon alpacas. The disposal of this may present a problem to producers but the cotton mills and converters hope for the merchandising support of the rayon sellers.

Exhibition Helps the Market

Viscose Showing Believed to Have Stimulated Interest of Manufacturers

The use of rayon by the American textile industry in all types of fabrication, particularly dress fabrics, is expected to show marked increase during the next year as a result of the Viscose Company's elaborate rayon exhibit which closed at the Pennsylvania Hotel Saturday, Sept. 21. This was described on page 47 of TEXTILE WORLD for Sept. 14, 1929.

Representatives of practically every large textile house in New York, as well as outstanding personalities in the trade from other cities in America and Europe, visited the exhibit during its ten days' run. Direct expressions from many of these that henceforth they would make wider use of the product, is responsible in part for the prediction that rayon is in for a great growth in popularity.

An interesting phase of the exhibit was that many women visitors who happened into the display room wanted to purchase materials for dresses at the show, and were angry when they could not.

The fabrics were artistically displayed within a large temple-like structure, 30 ft. wide and 45 ft. long. The entire setting was manufactured in England and was brought here by Miss Elsie Collier, representative of Courtaulds' Ltd., who staged the exhibition for the Viscose Co. here.

Notes on Rayon for Narrow Fabric Manufacturers and Others, Discussing Yarn Numbering, Delustered Products, Covering Properties Due to Twist, Sizing, Finishing, and Duplication of Samples.

Looking Forward *in the* Narrow Fabric Industry

By Edwin J. Gibbons

AN improvement that deserves encouragement is the proposal to name or number rayons so that one can distinguish between the multifilament rayons and the regular types. Two proposals have been made. One is to designate the different kinds as "regular" (filament), "intermediate," and "multifilament." The other is to designate the different kinds by showing below the denier count the number of filaments of which the yarn is composed, separating the two by a divisional line such as is used in many of the other yarn standards. A 150-denier rayon of 24 filaments would then be written 150/24; a 300-denier rayon of 40 filaments would be written 300/40, etc.

The second proposal seems the better of the two. By this method no chance would be left for a misunderstanding as to the number of filaments in any particular rayon, whereas the first method leaves much to be desired. In reference to the second method, however, some confusion may ensue when the yarns are plied. Our suggestion would be to place the denier counts and the number of filaments of which the same is composed on a single plane, separating the two by either a period or a colon, thus, 150.24, or 150: 24. Folded yarns may then be written 150.24/2 or 150: 24/2.

Future for Multifilament Yarns

Multifilament rayons ought to find a fertile field in narrow fabrics. What little has already been used has proved generally to weave or braid considerably better than the regular filament rayons. This seems to be due in part to the fact that if a filament breaks it does not show so great a tendency to bunch up behind the reed (one of the worst troubles with which the rayon weaver has to contend), and in the case of not too fine reeds will often weave into the material without any trouble. This advantage alone ought to more than offset any small premium in price.

The appearance of fabrics made from multifilament rayons is much superior to the appearance of those made from the regular filament rayons. They are less metallic, and have a look of quality.

Use of Delustered and Spun Rayons

Little of the dull luster (delustered or subdued luster) rayon has as yet found its way into narrowware in this country, but what little has appeared has been in ribbons. And this is its natural field. Alone, this material makes up into a beautiful fabric not unfavorably comparable with the goods manufactured from silk. In combination with full luster rayon, novel striping effects may be secured. The weaves so far employed are the long float weaves such as the 5-harness and 8-harness satins, the 4/1 twill, etc.

The use of dull luster rayons in the heavier types of narrow goods in which rayon is ordinarily employed (suspenders, belts, etc.), unless judiciously planned, will only rob the fabric of the feature upon which it most depends—brilliancy. When used in combination with cotton, particularly when of the same or a similar color, the dull luster rayon is apt to resemble regular rayon, the luster of which has been destroyed by the use of wax, tallow or paraffin.

It is not too rash to predict that dull luster rayon will be used extensively in the near future in the finer grades of lingerie tapes and allied products, either by itself or in combination with the full luster grades. The bands on the more moderately priced grades of men's hats, of both felt and straw, is another potential field for both dull luster and spun rayon yarns, either alone, together, or in conjunction with regular luster counts.

Spun rayon, also, has as yet found little place in the narrow fabric trade. Until very recently this material has generally been manufactured on the French worsted, the Bradford worsted, or the woolen systems and, consequently, has been of relatively coarse counts or size. But at present quotations are appearing in the English trade journals for single spun rayons in various counts ranging from 20s to 60s, cotton counts (denier equivalents 265 to 88), and in the two-ply from 24s-2 to 60s-2 cotton counts.

With these finer counts available this product ought to find some market in the narrow fabric field, especially in the ribbon branch. Here its most likely use would be for edges and for stripes. It ought also to find favor in the manufacture of labels where it may be substituted for silk.

No "Conservatism" Here

The word "conservatism," so far as it can be applied to the field of rayon, especially in narrow fabrics, may well be forgotten. For, with the recent improvements in the quality of all common rayons (including multifilament, subdued luster, and spun rayons), and the improvements that are continually being projected, the range of this material is unlimited and need not be hampered by even the mildest synonym for conservatism.

An outstanding feature of the year, and one that ought to be welcomed by the small consumer, is the offering by one enterprising rayon manufacturer of a combined oiling and winding service. This will afford the opportunity to those who take advantage of the service, to do away with the haphazard methods of lubricating as now

pursued by the small consumer, and a more uniform product ought to result.

Sizing and Finishing

Scouring rayon is an almost unheard-of process as regards narrow fabrics. Whatever sizes (starches) or lubricants are used are generally of a type that almost entirely disappears either through evaporation or friction during, or shortly after, the process of weaving. If tallow, wax, or paraffin are used, however, scouring may be found necessary, and this is one good argument in favor of the abandonment of the use of these ingredients.

The fallacy that prevailed in the earlier stages of rayon experimentation that the more elaborate the sizing preparation the better the results, seems to have fallen away in favor of the more sensible idea that the simpler the preparation, other things being equal, the better the results. As far as two-ply rayon is concerned the writer has heard of not a single instance where any lubrication or size has been employed, or been even remotely necessary, either in weaving or in braiding.

Among those manufacturers using sizing compounds, and who are finishing a great amount of rayon goods, gum arabic, gelatine, and gum tragacanth are being given preference over the starches. Starches (potato, rice, etc.) are opaque and hygroscopic, and when dry do not lend themselves to elongation. As rayon has the nature of stretching considerably, the starch cracks and will drop off, often without having served its purpose. Dextrine is little better than the stock from which it is made.

On the other hand, gum arabic and gelatine are not only strongly adhesive, but are transparent and elastic, and contribute a little luster of their own. The gum arabic is particularly highly resistant to friction. Both are prepared by being allowed to steep in cold water for a few days and then diluted to the desired strength. Gum tragacanth, though strongly adhesive, is apt to be opaque if used in too heavy solution.

Normally, rayon has no scroop (that noisy "feel" that is natural to real silk), but this quality may be imparted chemically though the treatment is seldom permanent, usually disappearing in the weaving or in the first washing. The only place that it might possibly be of any value in narrowware would be in ribbons.

One bugbear that seems to be losing its power to terrify the user of rayon is the problem of humidity. It would be interesting to learn just what percentage of narrow fabric manufacturers pay any attention to the degree of humidity in any department of the plant in which the rayon is processed, providing it does not reach a point where it is uncomfortable for the operatives.

Growth of Use in Suspenders

Important among narrow goods of rayon that have made great strides within the past year are suspenders. The manufacturers of this commodity have been conducting a nation-wide campaign in an effort to create a demand for their product, and they seem to have succeeded to some extent.

Almost no limit has been placed on the expense of manufacture and the result generally has been a product of exceptional quality. Twenty-two dollars per gross yards is not exceptional. The designs range over a wide field, many of the figures being representative of the different sports, such as yachting, golfing, tennis, etc. Another line includes dogs, horses, etc. The reproductions shown in Fig. 1 are representative of a line of set figure patterns.

A feature of this latest mode trend is that of suspenders for the ultra sporty members of the fair sex. These are usually worn in combination with sport skirts. Lingerie tapes and allied materials of rayon, many of them made from the finer counts, are still keeping many of the fancy looms running, and also many braiders employed.

In designing narrow fabrics constructed of the well known Barathea weave (one system of warp composed of stuffer ends and binder ends, and two system of filling, back and face—but one shuttle—the two fillings being bound together by the binder threads), the direction in which the shuttle passes through the shed in making the face picks has much to do with the appearance of the material. If regular-twisted, single (left-hand) rayon is used, the shuttle should pass from right to left on the face picks and return on the back picks. When interlacing in this direction the effect is equal to taking twist out of the filling yarn and, consequently, the covering capacity of the yarn is increased. Interlacing in the opposite direction is equal to putting more twist in the filling and, of course, decreases the covering capacity with the result that the material is apt to look skimpy.

Fig. 2 shows two repeats fillingwise of the Barathea weave as it appears on point paper. No edge weave is shown. The arrow shows the direction in which the

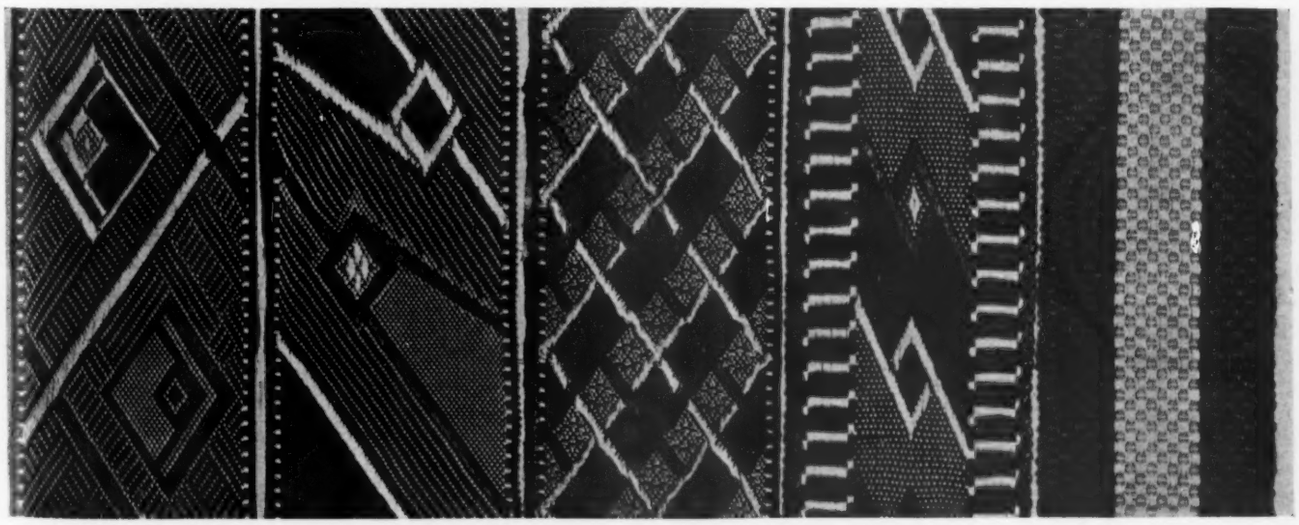


Fig. 1. Representative Suspender Web Patterns

shuttle must start in order to obtain the best results. Fig. 3 illustrates fabrics made with the Barathea weave.

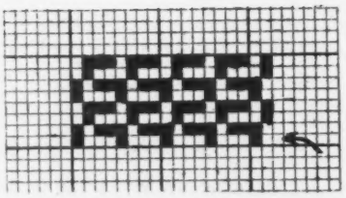


Fig. 2. The Ends Interlacing in 2 Up and 2 Down Order Are Binder Ends; the Ends Interlacing in 1 Up and 1 Down Order Are Stuffer Ends

Trouble of a similar nature is sometimes encountered in manufacture of elastic braid; that is, the yarn not properly covering the rubber. One instance of this sort, recently brought to the attention of the writer, was due to the manner in which the yarn was drawn from the supply of package-dyed parallel tubes. The yarn was drawn over the end of the tube as shown in Fig. 4. As the normal direction of twist of single rayon yarn is as shown below the tube, the result of drawing the yarn off as indicated above was an increase of turns twist per inch, as can be easily understood from a glance at Fig. 5, which represents a roll of tape or paper. If the tube of yarn had been turned end for end the trouble would have been overcome.

When two rayon threads are tied together the ends of the knots should always be cut closely. Otherwise they are almost certain to cause trouble at the loom. The ends will become frayed with the continual changing of the shed and will wrap themselves around the neighboring threads and attempt to hold them either up or down. Eventually, not only the thread in which the knot was tied will break out, but also the threads with which it has become enmeshed.

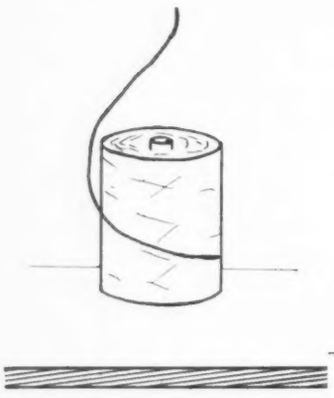


Fig. 4. Drawing Yarn from Tube; Below, Direction of Twist in Single Yarn

Fig. 5. Showing How Twist Is Increased by Unwinding

In jacquard work the knot ends will often hold up neighboring ends when they should be lowered (they cannot hold the other ends down because of the positive lift of the jacquard head), and a defective float will be made in the fabric.

Few users of rayon realize the uniformity of size or denier count of this material. Of all textile fibers this is the one over which the manufacturer has at all times absolute control. In analysis work there is seldom any doubt about the result of an equation to find counts. In cotton one may arrive at a 33's and be uncertain whether to term the material a 30's or a 36's; or the result may figure a 22's, which might mean 22's or might mean 20's or 24's. But with rayon there is little to be guessed at. It is quite the exception that the yarn does not figure out exactly on the dot.

With the more general use of the different types of rayon the problem of the manufacturer who must duplicate a given sample increases correspondingly. It is no longer possible to determine with accuracy the type of a particular rayon by the counts and number of filaments, even with an up-to-date chart showing the number of filaments being put into the different counts by the various rayon manufacturers; for at present in many cases, the same counts in the different types and brands consist of an equal number of filaments.

Fig. 3. Fabrics Made with the Barathea Weave

Duplication of Samples

Much has been written concerning the application of chemical tests for identifying the four common types of rayon—viscose, cuprammonium, nitro-cellulose, and cellulose-acetate—but to the rank and file of consumers these tests seem fraught with complications and inconvenience. On the contrary they are quite simple and efficacious.

Any chemical supply house will be glad to put up in one- or two-ounce bottles equipped with combination dropper-stoppers and the following preparations:

1. Glacial acetic acid (water white).
2. Concentrated sulphuric acid (specific gravity 1.84) containing 1% diphenylamine.
3. A 1% solution of Carminic acid to which has been added a few drops of ammonia.

Besides these a small porcelain dish or an eye-cup will be needed. The entire outfit will cost in the neighborhood of $3.00, and will take up but little room in a desk drawer. Fig. 6 illustrates the assembled equipment.

The manner of conducting the tests is as follows:

(A) Place a few drops of No. 1 solution in the porcelain dish or eye-cup and immerse a few strands of the rayon to be tested. Cellulose-acetate rayon will immedi-

(Continued on page 133)

Fig. 6. Simple Equipment for Chemical Tests

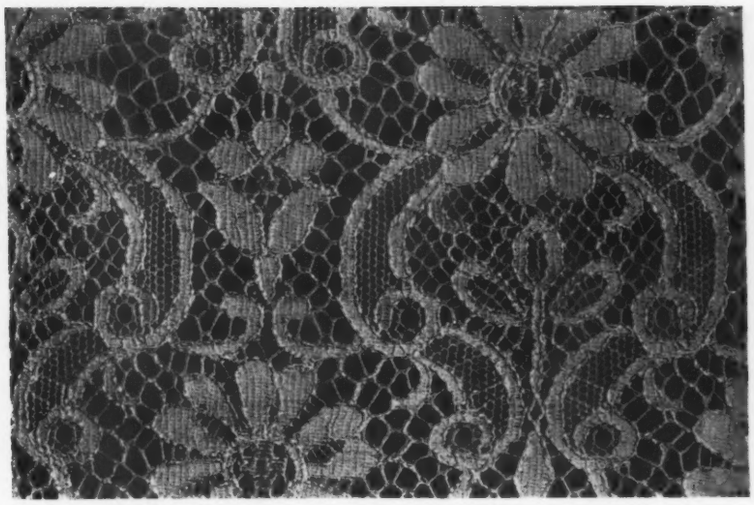


Fig. 1. Levers Lace Pattern of All-Over Design

RAYON *in the* Lace and Trimming Field

By Robert P. Marenzana

The Style Quality of Rayon Laces and Trimmings Appeals to the Trade. Replacements and the Constant Introduction of Seasonable Colors Bring a More Steady Flow of Business and Enable Production to Continue Through the Slack Season Formerly Experienced.

IN SEEKING new fields to conquer, the lace and trimming industry has found that traditions are good things to forget. It has found that novelty is a most valuable feature. The staple articles of cotton and linen will, no doubt, have as wide an appeal as ever. But wherever practical and inexpensive merchandise, having a lacy silky appeal of beauty, is needed, rayon has been the material picked as the most appealing and advantageous.

From a few crude patterns, timidly featuring a thread or two of rayon, the use of rayon in laces and trimmings has grown in leaps and bounds over a period of about three years, until now no line would be complete without a number of featured all-rayon numbers. The producers themselves have helped bring this change about by the improvements in the fiber itself. A smooth uniform and evenly lustered yarn is today the rule rather than exception.

The most popular sizes are, of course, 150 and 300 deniers. These sizes are plied and twisted to make up yarn for individual requirements and machine peculiarities. For example, a rayon yarn used extensively by the trade is known as "lace twist." This yarn is a 150 denier, given 5 to 7 turns left-twist in the single, and doubled with 10 turns right-hand. This forms a very attractive yarn; clean, and free from all projecting fibers. It finds extensive use in the all-over laces made on levers machines and is also used, together with cotton, for producing unusual and clear-cut effects in the design. Fig. 1 shows a levers lace pattern of all-over design. This pattern has had its beauty and utility greatly enhanced by the outlining of the main portions in rayon.

Various narrow laces are made up with a rayon yarn formed by plying 300 denier. This is used in two, three, four, five or six ply, depending on the weight pattern desired. This yarn is not twisted in the single. The necessary ply is made and then given from two to three turns of right-hand twist. It differs from lace twist in that it is a smoother and softer yarn. This yarn when braided or woven has good filling qualities, producing a good solid pattern that is very soft and flexible.

For the narrow fabric and braided lace trade the heavier denier rayons have lately found appeal. In preference to using a 2-ply 300, a single 600-denier strand is used, and the 900-denier rayon is employed to replace a 3-ply 300. At present the use of these heavy deniers is confined to a few manufacturers. In actual use this yarn has a tendency to split fibers. This can, of course, be overcome by giving a few turns to the rayon before dyeing or weaving.

A rayon yarn known as 3/3 is used extensively for many fringes, trimmings, and other narrow fabrics.

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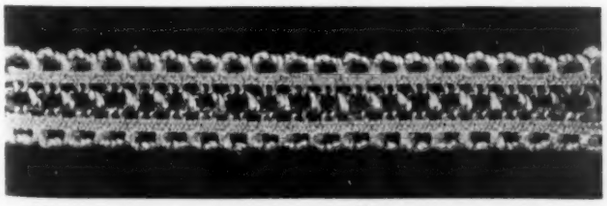


Fig. 2. Novelty Trimming Using 10/2 Rayon on Edges and in Center; 3/300 Rayon for Balance of Pattern

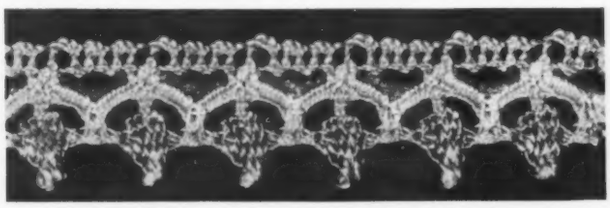


Fig. 3. All-Rayon Lace Trimming Using 10/2 Rayon for Color Motif

Wool Goods Industry,

Although Still Small Consumer of Rayon,

Is Expanding Its Use

By A. H. Thurston
Editorial Staff, TEXTILE WORLD

THE wool goods branch of the textile industry, while a smaller consumer of rayon than either of the other two textile fibers, nevertheless shows an increasing tendency toward a more liberal use of the synthetic yarn. When it is realized that the average men's wear suiting, when it does contain rayon, has an approximate synthetic fiber content of 2 to 4%, infrequently running as high as 8% in the cheaper grades, it is rather self-evident that rayon sales to wool goods mills are comparatively small.

Well-informed wool manufacturers are of the opinion that the very smallness of their market is one of the factors keeping down the consumption of rayon. In other words the field is not large enough at present to warrant chemical yarn producers spending the time and money to develop a fiber particularly suited to be used with wool. This statement does not include any of the recent developments in the staple fibers, or so-called wool substitutes, but merely with the rayon yarns which we have in the market today.

Rayon's main use in the wool industry is as a decorative medium and for this purpose possesses two advantages when compared with silk, namely price and resistance to wear. Because of the price angle of rayon it finds its greatest field in low and popular-priced goods, although there is a small consumption in certain types of high grade men's wear. When the price of the fabric is the main consideration, as it often is, and a highly decorative effect desired, the rayon content can be approximately five times greater than silk without increasing the cost. From the standpoint of wearability, it is claimed that rayon will outwear silk, but even with this there is still a lingering prejudice against rayon among garment manufacturers and consumers. This is without doubt a hang over from the infancy of synthetic fibers when a good deal of the yarn was unsatisfactory and did not give service. Coupled with this was the lack of knowledge of the proper way to handle rayon in manufacturing. The trials and tribulations of the past cause a great many cutters-up to specify all silk decoration in their orders.

Care in Styling Needed

The manufacturing difficulties attending the use of rayon have been largely overcome, but it must be handled with care by stylists and designers. The new low-luster and delustered rayons have been tried but so far manufacturers report but little success. The high luster of rayon is one of its advantages in a wool fabric, but for this same reason must be used sparingly or the cloth will take on too much of a glare. Some of the most attractive goods have the rayon interspersed and sprinkled throughout the cloth, giving an all-over sheen rather than forming any definite pattern. This particular use seems to have gained greater headway in women's wear than in men's wear. Several of the newest spring lines have utilized rayon in this "random effect." It also points to what may eventually prove to be the largest source of rayon consumption by the wool industry, as this usage allows a greater rayon content than would be possible if the synthetic yarns were to be grouped in a pattern.

One of the most common uses is as a silk substitute in stripes, mainly to reduce costs. It is often used, however, in combination with silk, colored worsted or both as a means of decoration. Twist fabrics lend themselves nicely to the use of rayon as the twist construction keeps the rayon from becoming over prominent. The cross-dyeing properties of the synthetic yarn become of value in piece-dyed wool goods where rayon is used at times to secure different effects.

Used With Wool in Underwear

A feature of interest is the new combination of a standard brand synthetic yarn and wool in the production of winterweight knitted underwear. This line was first put on the market toward the end of the current summer and was cordially received by the trade. However, the line is still too new to be able to gauge its future with any accuracy. The venture is significant, as it marks a change in one of the most conservative of the knit goods fields. Hitherto rayon has been used in heavyweight underwear only as a decorative yarn. In the new garments a good proportion of the fabric is composed of the man-made fiber. One of the main advantages stressed in promoting the line is that it permits artistic and attractive effects in winter garments, and at the same time retains their warmth-giving elements.

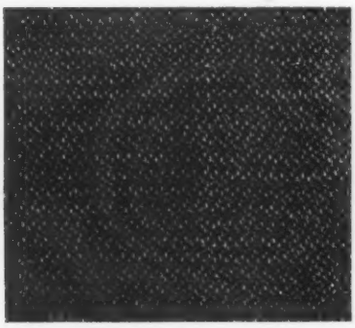
With its many inherent advantages, rayon is a valuable accessory to the wool manufacturing industry although it is hardly expected that it will ever reach a point in that field that it has in silk and cotton manufacturing. This is taking into consideration the fact that it may eventually displace silk, as was predicted by a prominent wool goods seller. With the ever increasing competition among chemical yarn producers, there is every reason to believe that greater attention will be paid to the wool industry with a consequent increased consumption.

Use of

Mixed Rayon and Wool

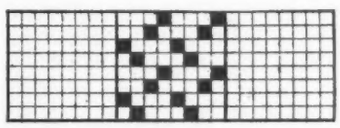
in Duvetyn

Staple Rayon Fiber Has Been Combined with Wool for the Filling of an Interesting and Pleasing Fabric. Yarns of this General Character Offer Opportunities to Manufacturers.



Face and Back of French Duvetyn de Laine

By James Chittick



The Weave

WITH the ever-increasing use of rayon in all branches of manufacture, its employment in connection with other textile fibers has been, of course, very greatly exploited. When used by itself, where both warp and filling are rayon, it may frankly be presented for just what it is, so that anyone can see at a glance that such a fabric is made entirely of synthetic fiber. Or it may be disguised in appearance, so as to simulate the aspect of silk; thus, such fabrics as crepe de chine may be made, in which a non-lustrous rayon is used for warp, and the same material, hard twisted, for the filling. This fabric, suitably made, will be very hard to distinguish by its appearance from the real all-silk article. When used in connection with other fibers, like cotton, silk, wool, etc., it similarly may boldly proclaim itself as rayon or else appear in disguise, as it were. A fabric made with cotton warp and rayon filling is usually immediately identifiable, but a crepe made with a raw silk warp and a crepe-twist rayon filling cannot be easily told from its appearance.

For the most part, rayon is used in connection with other materials for the purpose of securing novelty fabrics of low cost. Rayon yarns are also used very largely for ornamentation purposes where brilliant color and luster are useful. In wool and worsted fabrics, in which there are fine, colored, striped, or checked effects, rayon is much employed for the "effect" threads. The main ideas, therefore, underlying the employment of this material in this field usually run along the lines of lower cost, imitation, or "effects."

Construction of Duvetyn

There are, however, fabrications into which rayon may be introduced without any cheapening of the material, or at increased cost from the manufacturing standpoint, where it may be cleverly employed for the purpose of modifying the handle and aspect of the goods. A French Duvetyn de Laine fabric has recently appeared on the market which exemplifies this idea. Two views presented herewith show the appearance of the face and of the back of this cloth.

The warp construction has approximately 68 ends per inch, as woven, a thirty-four dent reed being used, with two ends through each split. The warp yarn is French spun worsted, about 2/90 in size (25,200 yards per pound—worsted count). This is made from the finest Botany stock, undyed. The filling is peculiar, and there are only 36 picks per inch in the cloth as woven, which would permit of an extremely rapid production from the loom. Each pick is made up of three threads twisted together, this ply yarn being left-hand twist and having only three turns of twist per inch. So that a first glance at the yarn, when removed from the cloth, seems to indicate that it is without twist. Each thread in the group of three is a two-ply yarn, this also being spun to a count approximating 2/90, same as the warp. These two-ply threads are right-hand twist, and have twelve turns per inch. The material from which they have been spun is the same undyed wool that was used for the warp, in combination with bleached artificial silk. The proportion of each is apparently about 50%, though the rayon may possibly be slightly in excess of the wool.

These artificial silk fibers are very fine, and are of a length similar to that of the wool. Under magnification, they suggest to the eye that some extremely fine filament yarn, such as Bemberg, has been used. Skeins of this may have been cut up into lengths approximating the length of the wool that they were to be spun with. Then, after thorough mixing, carding and combing on the French system, they have been spun into single yarns of the size stated: these in turn being doubled and twisted into two-thread yarn, and then three of

(Continued on page 128)

Synthetic and Vegetable Fibers in Woolen and Worsted Manufactures

A British authority points out that new fibers other than rayon are claiming the attention of textile manufacturers. Further progress has been made by staple rayons and for certain types of fabric they have developed remarkable properties.

By Brompton

THERE is hardly a month passes now without some new fiber being introduced to the industry. Three have been brought to our notice during the last two months and each, when examined, has turned out to be of vegetable origin, bleached to resemble wool in at least one aspect—color. Of course, it has been known for years that vegetable fibers number hundreds, but only as many as can be counted on the fingers of both hands have been exploited. Now we have nettle, maize, and grasses of every clime and country coming into the industry and, instead of going to the flax and jute manufacturers, as might reasonably be expected, they are sent to cotton, woolen and worsted mills with the hope that these plants will adopt them in place of the better known materials. This we believe to be a mistake; each fiber should stand on its merits, have its own method or methods of manufacture, specially suited to meet the peculiarities of the material (there are no two exactly alike) and with workers trained to handle and study its problems.

For example, only recently we were called upon to prepare by gilling a special consignment of mercerized ramie. Our machines were not the best for the purpose, as we believe that slowly moving garnett-covered rollers of about 6 to 8 in. diameter, arranged in pairs and with gradually progressive speeds, would have achieved opening and sliver making (prior to combing) much more quickly. However, the case serves to show that the new fibers should be studied and machines designed for their treatment, rather than to expect existing machines to fill the rôle.

Not all fibers introduced make a stir upon entry, or become known when successful; it largely depends upon whether the sponsors are exploiting a fiber in the raw or partially treated state, or whether they prefer to market it as a finished article, say cloth or garment, allowing the new fiber to lose its identity among other fibers. If it is desired to sell the raw material, publicity is given and its advent is heralded, often with a flourish unwarranted and unjustified, as an examination of the material reveals. On the other hand, new fibers have been mixed with old, fabrics made, and the public have been wearing them before being aware that any new fiber had been introduced.

A New French Fiber

The newest "advertised" fiber is N.T. (Nouveau Textile), a French product, and judging by its appearance made from waste jute. This has been bleached and defibered, and is thus made to resemble wool in at least two properties—color and fibrous character. It has somewhat the appearance of a white, vegetable looking mungo.

This material comes to us to be "blended with wool in the manufacture of blankets, felts, carpets, and tweeds." For the first named we are reminded of Brooke's, "The rough male kiss of blankets which soon smooths away trouble," for we are persuaded that roughness will be a feature of blankets made from it, unless a sufficient percentage of wool is mixed with it to hide it. It promises better as a suitable material for felts, especially for felts used for packing, say, under carpets, and we unhesitatingly recommend it for this purpose, as the new material can be produced cheaply, from 12 to 18c. per pound. Let me say at once that it is so different from synthetic fibers, such as staple viscose and acetate, there is hardly any fear that they will become rivals; it is simply introduced into this article to show that fibers, other than rayon, are also claiming the attention of textile manufacturers.

For carpet manufacture, N.T. should receive a welcome. In this particular use it may fulfill its destiny, and the inventor, M. Joseph Viallet, may yet be considered a timely benefactor to the carpet manufacturing section of the textile industry. For tweeds it will need to be helped out by a goodly percentage of wool. The material is cheap enough to be considered, but the first cost is not the last, on account of the dust, which becomes invisible waste in carding and spinning. Wood and N.T. fabrics may be labeled "Free from Cotton," but wool textile men and many cloth buyers are possessed of a sixth sense which tells them, without experimenting, whether goods are all-wool or not. We believe that this new fiber will be of greater interest to woolen manufacturers than worsted, on account of the mixed length of fibers in the raw material.

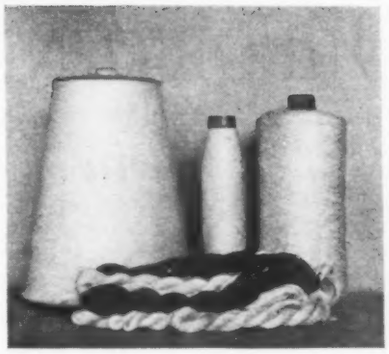
The harsh handle of N.T. has brought forward the suggestion that it would be very serviceable for shirtings in the Sahara desert. There, in the absence of walls and posts, a man could lean up and rub against his shirt to relieve any irritation troubling him!

Staple Rayon Fiber

Staple rayon is still being pushed and has certainly an important place in modern textile manufacture. The cotton industry is finding even greater use for it in England than the woolen and worsted, but we believe that is because their system of yarn making gives better and more uniform results than the woolen or worsted. Rayon is now being cut into cotton fiber lengths, for working up alone or in association with cotton, and the "ray de sheen" class of fabrics will continue in demand for

some time yet. Again, other uses are already being made of these yarns in the knitting districts and for figured velvets. For the velvets, the longer stapled rayon, worked up in the worsted industry, is also used. These are woven double and cut in the loom.

The superiority of rayon velvet over cotton is conclusively demonstrated by weaving in the same piece of fabric a length of cotton pile filling and a length of rayon pile filling. Woven in the same loom and dyed in the same piece the rayon pile has an amazing advantage over the cotton pile, not only in handle and luster, but in the richness and depth of tone in the dye. Velveteens with a rayon pile show, when draped, a pleasing shot effect.



Blendia Yarns and Blendia Fibers

One of the problems in connection with the plain rayon velvet has been the defect known in weaving as pinrow. Much is being done by the use of spun rayon which obviates, or at any rate, minimizes this shading of the filling. A viscose cut material, mixed and spun up will, by the law of averages, produce a more even effect in dyeing than an ordinary viscose yarn, besides giving a fuller pile.

Celta, the hollow filament rayon, approaches more nearly to real silk than does the ordinary viscose yarn. One large firm of fur fabric manufacturers uses Celta yarn almost exclusively. They make a specialty of the lightness of their fur fabrics; Celta is warm, light, has a good covering power and the effect is more like real fur.

In the manufacture of women's wear, rayon has been utilized to a much greater extent than for men's wear, although certain manufacturers have made a study of utilizing to the best possible advantage rayon for men's wear, and their success has been the envy of their less skilful rivals. The great factor which has helped them to success is the methods they have practiced for the avoidance of "sheen" on the fabrics produced. Plain weave cloths from mixtures of wool rayon are of little use, but mixture effects in checks, chevrons, and broken designs have sold. Viscose rayon has been the most successful rayon used in making men's wear cloths. In woolens it has figured in stripings, and, chiefly for the cap cloth trade, has been used in the garnetted waste form blended with wool. In worsted, the viscose rayon has figured in a small way as stripings, but preference has been accorded to the spun rayon type of yarn as spun in the Brighouse district on waste silk machinery from tops of staple viscose.

Cuprammonium rayon is not a success as a "fibro" or cut material. It neps too freely, slubs very badly in gilling, and has too much of a cotton appearance when blended with wool to be a success.

The acetate class of rayon has not yet received the attention which it deserves. There is a big future ahead for this class of fiber if properly handled. If the makers of this class of rayon had been as quick to realize the possibilities of cut fibers as the makers of viscose have shown themselves, there would have been a steadily growing output of this material.

In the worsted trade combed acetate tops (when procurable) may be blended with wool, mohair, or camel hair and two-color effects produced by cross-dyeing. These may be blended with mixed viscose and wool, and three-color effects obtained by cross-dyeing. They may also be dyed and subsequently blended with a mixture of wool (or mohair) and "blendia," etc.

Weaving rayon yarns still presents problems to the manufacturer. Rayon is easier to weave as warp than as filling. This was not always so, but the improvements in winding, warping, and sizing of the warp has eliminated much of the trouble in weaving warps.

The new fiber Blendia is fulfilling the earlier expectations concerning its use. It was said last year, when it was introduced to the trade, that it was the nearest approach to wool that had been seen of a vegetable origin. Everyone who sees the material is impressed with its wool-like appearance. It is better than cotton for blending with wool as it has a more woolly handle and the fiber more closely approximates that of a wool fiber than cotton. It is stronger than cotton, and has a greater staple length, which enables it to be combed into a top. It possesses several advantages over synthetic fibers which are used for blending. All the synthetic fibers used in the textile industry have one disadvantage in that they lose strength as soon as they are wet. This disadvantage does not apply to Blendia, in fact the process is reversed, as this fiber is stronger wet than dry. This property is of great importance for fabrics worn next to the skin and picking up perspiration.

A further line which is being given close attention is a yarn produced by blending Blendia with dyed or white acetate top, and throwing this yarn as filling across a linen warp. After dyeing, the acetate fibers are left white. This is a distinct novelty in the linen trade.

When it is intended to blend wool and Blendia tops to produce a two-color effect by cross-dyeing, care should be taken that the Blendia is dyed or tinted the darker color. Blendia is more opaque than wool and as a result reflects light in a different manner. It is permissible and even desirable to dye the fiber the darker shade first and wool-dye only in the piece; in this manner a series of effective mixtures can be produced with a minimum of effort. For the men's wear trade pieces often contained 50 per cent dyed fiber and 50 per cent fine (undyed) wool top. These pieces often contain all wool warp or filling threads undyed to break up into a requisite design, and from one piece so made a range of ten or eleven mixtures could be made by wool dyeing in the piece.

Considerable economies are effected in stocking in the wool-undyed state. Deliveries of any desired "mixture" could be effected in 14 days, whereas under the general all-wool mixture system, if any particular mixture was sold out, three months was required to replace it.

OPPORTUNITIES
in
New Rayon Fabrics

If proof were needed of the great opportunities that are present for new rayon fabrics, it could be supplied by the success of crepes and piques, described in this article. An interesting trend is the development of higher grade goods, which is a welcome relief from the cheapening of fabrics.

*By Alexis Sommaripa**

THAT there are great opportunities in developing new rayon fabrics, and in concentrating on quality merchandise, has been demonstrated this year by the outstanding success of crepes and piques made of rayon and cotton, and also of all-rayon flat crepes. Considerable experimentation on the part of the mills, the throwsters, the brokers, and the converters was necessary to create these cloths. Although fine rayon and cotton crepes have been a volume proposition in England for the last two years, and the rayon flat crepes have been sponsored by Paris for some time, a great deal of courage and vision was required on the part of rayon converters to merchandise these higher priced goods.

As a result of such efforts, however, they were enabled to secure greater dollar volume; to enter a new market, namely, the higher priced dress manufacturing trade; and also to make their business more of a year round proposition. This trend toward better fabrics is very encouraging. The textile trade often suffers from the fact that keen price competition results in wilful deterioration of fabrics by the reduction of the yarn content, or excessive adulteration by foreign matter. In the rayon fabrics field the contrary is taking place, as better and more expensive fabrics are superseding coarser, lower grade constructions in many of the markets.

*Manager, Business Research, Du Pont Rayon Co.

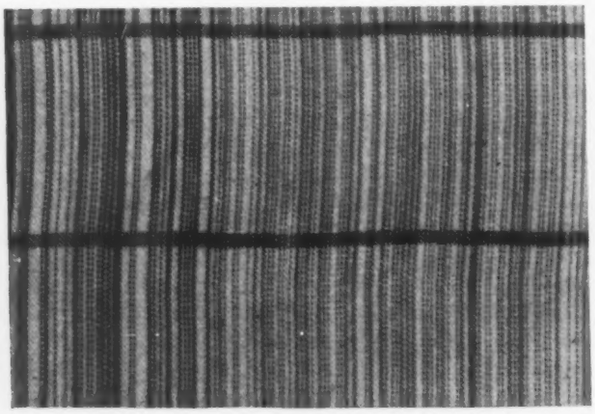


Fig. 1. Tub Silk Effect

Rayon flat crepes, indeed, are far superior to the so-called rayon alpacas for dress goods purposes. They are made of much finer cotton and multi-filament rayon, and contain a greater number of picks and ends. The result is that they are much softer to touch, drape better, and have a subdued luster of greater refinement. By the use of special finishes or novelty in design, individual character may be developed in this cloth. Fig. 1, for instance, shows a cloth which in its appearance, texture and design is very similar to tub silk. In fact, in England it takes the place of the latter type of cloth. This fabric is yarn dyed. It has three different colors in the warp and two colors in the filling.

Fig. 2 shows an attractive jacquard cloth which has been printed. The woven design shows through the print, creating a very novel and interesting effect. This combination of printing and weaving on crepes was extensively used by the French during last summer in rayon and wool, or rayon and silk crepe. It is possible, therefore, that a rayon and cotton crepe of such description may prove to be of interest in this country. The major part of the domestic production of rayon and cotton flat crepes has a cotton creped warp and a rayon filling. In Europe, however, rayon warp and creped cotton filled Canton crepes have been very popular. The popularity of the silk Canton crepes speaks well for the success of such creations in this country. It is of great interest that the production of rayon and cotton crepes requires fine cottons. This makes them very desirable for cotton mills, as a greater utilization of their spindles is possible in the manufacturing of these fine yarns with high twist.

Popularity of Crepes

The rayon flat crepes have been so popular in France that it is possible they have started the fashion for flat crepes in this country. It is estimated by style authorities that flat crepes for dress purposes are outselling crepe de chine ten to one. The Canton crepes and marocain crepes are also very important and on the increase. All these crepes, however, are at their best when made in a

heavy generous weight. Pure dye rayon flat crepes have been very successful due to the fact that they are well adapted to intricate working and soft draping, demanded by current fashion. The supple nuances of their bright colors are fast to washing, and the fabric does not shrink as is the case in over-weighted cloths made with only a small proportion of silk in them.

The reaction from the fluttery, clinging sheer fabric for women's wear toward a stiffer and a heavier semi-sheer fabric will probably benefit the demand for rayon georgette. The latter cloth, up to now, has not been made in multi-filament constructions, which brought it the criticism of being too harsh. The use of multi-filament yarn entirely overcomes this difficulty. On the other hand, rayon georgettes are easier to cut and sew, which is of great importance with the cutting-up trade. There are possibilities, therefore, for their entering this field, which up to now has not used rayon voiles. It is very likely that almost forty million pounds of silk

Fig. 2. Jacquard Woven Cloth with Printed Pattern

fabrics containing creped yarns are made annually. The advent of rayon crepes will unquestionably greatly extend the consumption of such fabrics among the masses.

Success of Rayon and Cotton Piques

The new rayon and cotton piques have had outstanding success this year. These fabrics, first launched last Spring, have enjoyed very favorable activity in retail stores. They have many qualities to recommend them, among which may be mentioned their appealing, lustrous construction and enduring freshness of appearance even after an entire day's wear.

Another field where rayon has been overwhelmingly successful is that of men's linings. Cotton mills have gained in these fabrics an entirely new outlet. They are, indeed, displacing cloths which have been previously manufactured by woolen or silk mills. This business, however, was secured only through the foresight and courage of leading converters, who invested heavily in the development of cloths and are also making great efforts to merchandise them in the best possible way.

Although the rayon alpacas have been superseded by rayon and cotton crepes for dress purposes, they are still an important factor for other fields. Rayon twills and satins have become a staple product for women's slips and negligees. Rayon taffetas are an established cloth with the millinery and the casket trade. Interesting fabrics have been developed especially for the radio trade, as well as linings for boxes and suitcases. It seems, therefore, that not only have some of the rayon fabrics become staple merchandise sold in large volume, but also some specialty cloths have been created which bring a steady business to the concerns that developed them.

There are unquestionably still great opportunities for developing woven cloths for men's pajamas, shirtings and underwear. The field of children's dresses is as yet almost new. Rayon table cloths and bed sheets deserve considerable additional creative and merchandising effort. Heavy rayon fabrics are likely to supersede the rubberized cloths for shower bath purposes. Rayon satins are favorably looked upon for mattresses, while many concerns manufacturing boxes, ranging from watch boxes to pencil boxes, are on the lookout for new cloths.

Velvets Become Volume Proposition

While it is apparent that the cotton mills and rayon converters have greatly availed themselves of the possibilities of rayon, and in some instances have taken over rayon fabrics previously manufactured by silk mills, the consumption of rayon by the latter is increasing. Great strides are being made in creating the highest types of rayon-containing cloths. The outstanding success, of course, is the transparent velvet which from an expensive novelty has become almost a necessity of the masses. It is estimated from the fashion standpoint that it will account for more than a quarter of all women's dress fabrics for the Fall and Winter seasons of this year.

Rayon velvets are not only important as fabrics of high style prominence, but they have also become a volume proposition, having been extended to lower priced lines such as $16.75 and $10.75 dresses. The more exclusive trade, on the other hand, is greatly interested in the other version of the transparent velvet, namely, the panne pressed velvet. The success of the rayon-faced velvets is due to their softness, drapiness and bloom, not obtainable with other fibers. It is of interest that this fabric, as well as the all-rayon flat crepe described above, was made possible by the use of the hundred denier super-extra yarn.

The present fashions lay stress on rich elegant fabrics. They also demand a certain stiffness in materials. The glowing richness of rayon satins has been the reason for their great success in Europe. They are already in demand in this country. Rayon taffetas, faille, and moire, are answering the call for stiffer cloths for evening wear.

Fabrics for Sport Wear

The European dressmakers and American buyers are showing unusual interest in new weaves and new effects in fabrics for sports wear. The vogue for fancies has probably been started by prints, but it now manifests itself in demands for new fabrics. The use of rayon in

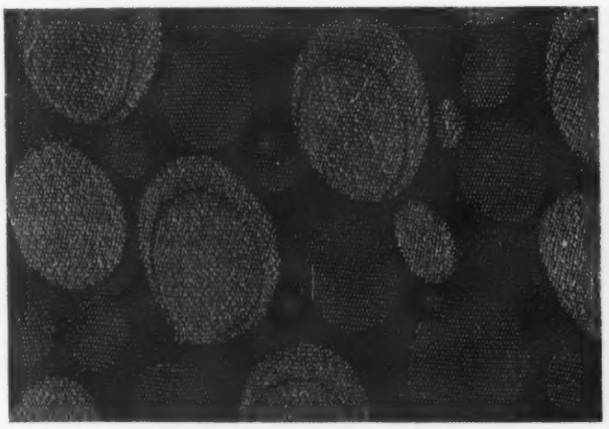


Fig. 3. Jacquard Crepe

Europe allowed the creation of new attractive cloths, such as all-rayon crepes with jacquard design, rayon and silk cravat fabrics, rayon marocain crepes with woven and printed designs, chine crepes, surahs, and gabardines, as well as faille and eponge. Fig. 3 shows an interesting jacquard crepe made of 100 denier super-extra and acele warp, with an all super-extra filling. All the above mentioned fabrics have possibilities as items of high novelty. It is claimed, however, that in this country there is a great dearth of new materials especially developed for sports wear.

Of all the fabrics with special finishes, the rayon moires have been the most prominent in this country. There are interesting opportunities in rayon cire, which has been popular in Europe, as well as embossed rayon cloths for various purposes.

Bathing suits in Europe are made a great deal with woven rayon fabric. In this country, the rayon moire so far has been an outstanding success. There are distinct possibilities in adapting, as in Europe, other fabrics such as rayon twills to this field, which has great potentialities.

Expansion in Upholstery Field

Rayon-containing fabrics take more than one-third of the upholstery-drapery sales of a representative group of retail stores. Rayon voile, marquisette and net account for about one-third of the sales of sheer casement cloths. Rayon damasks take more than one-fifth, and rayon taffetas, satins and rep take about 8% of the total sale of upholstery-drapery departments. The bulk of sales of rayon damasks is at less than $3.00 per yard, which indicates that rayon made it possible for an average household to possess richer, glowing, decorative fabrics.

It is of interest that the relative importance of rayon damasks is much greater in popular price stores, and in small cities, than in large cities and in stores catering to a high clientele. The reverse is true of the sales of silk. It seems, therefore, that the opportunity exists to create high priced jacquard rayon fabrics for the better trade. The advent of low luster yarns makes it possible to create rayon damasks with a more subdued sheen, which will probably have a greater appeal to the higher classes. Rayon taffetas and damasks are less popular in summer than in winter. They are probably not as well adapted for summer furniture. There is, therefore, an opportunity to create special fabrics with woven designs to fill this particular demand.

Rayon taffetas, satins and reps are more important in large cities and exclusive stores than in small cities and in the popular price trade. Such conditions usually indicate the beginning of a trend and show that the demand for the lower trade is forthcoming. In the decorative trade of the highest order, a distinct demand for plainer fabric is manifested. Several new rayon cloths, such as shikiis, jaspes, and antique satins have met with considerable favor. Plain rayon satins, particularly, have been acc'aimed. The heavy weight of rayon satins used lavishly resulted in luxurious, graceful folds of drapes, the light and shadow effects of which give them certain added depths. This cloth does not show fuzziness characteristic of some satins, where a cotton back shows through a thin silk face. The resulting gleam of the surface makes the satin reflect the surrounding colors, thus blending well with other objects, or supplying a good background for them. This is probably the reason why it has been used for very chic wall coverings and window displays, as well as for opera and follies.

Although about one-third of the sales of upholstery and drapery fabrics is in printed cloths, there are practically no rayon printed decorative fabrics. The use of rayon-face cotton-back satins, or of rayon and cotton taffetas, for printing would result in cloths of rich appearance, subdued sheen, and agreeable smoothness and softness. Hand-blocked or printed designs similar to chintzes could be used, but the glazed effect of rayon would be permanent. Other cloths of rougher textures could be printed for summer furniture, while semi-sheer fabrics as ninon in appropriate designs, would supply attractive hangings to be used for a dual purpose, taking the place of casement cloth and drapery. Plain ninon or sheer alpacas have been successful in Europe and bid well for this country.

Rayon Knit Goods Development

Progress Made in Hosiery, Underwear, and Outerwear Productions

By William Davis, M. A.

THE manufacture of rayon knitted goods in England has certainly entered on a very definite phase. Rayon has come to be an indispensable factor in the knitting industry and has exerted a quickening influence in all branches. The seamless hosiery trade has been steadily growing and articles for wear by the millions are chiefly made on American-built machines. In such seamless footwear the usual types of rayon are being used, but there is an increasing demand for the finer filaments which have low luster, and the makers are now coming very near the appearance of real silk in such types. The filaments, being finer, do not trap so readily on rough surfaces as the mesh is closer and denser, but they are more susceptible to rough skin and projecting edges of finger nails.

Increased competition has caused prices of rayon hosiery to drop, and at present enormous quantities of seamless rayon stockings are being sold in the shops at one shilling per pair. To sell the products at such a price the factories have to be run on double and three-shift systems; that is, three working periods of eight hours each, this being popularly known as the American system of operation. The three shifts, however, are not always successful and many concerns find that they lose a great deal during the third shift. The idea is to economize on overhead expenses. In practice, it has been found that the night workers take a good many liberties, production lags behind, and pilfering has become a somewhat serious matter.

Stockings Vary in Length

One great bugbear is the difference in lengths of stockings made on the night and day shifts, particularly if the yarn has to be dampened. The winders generally produce enough in the daytime to last through the night and as it is being worked up, the dampness dries off, thus altering the knitting properties of the yarn and causing the lengths to vary. But the machines also vary in their running qualities; the cooler air causes minute alterations in the condition of the machine metal and the stitch formation is affected.

A large maker of humidifying equipment has recently reported that he is installing such plants more frequently

in knitting factories for the successful working of rayon on tubular, flat, and warp knitting machines. Rooms in which yarn is stored are provided with humidifier heads and prevent material from drying out. In many cases when the yarn is taken to be wound it dries off somewhat, but after winding it is placed in the conditioning room until required on the machine. On the knitting frame it may be inclosed in a damp chamber during knitting. Such practices minimize the amount of oil required and are followed particularly where real silk and rayon are employed together, as in plated goods, or when doubled and twisted.

There has been a great improvement in preparing the yarn in winding, particularly in the matter of knots. It is now standard practice to bring these to the outside of the bobbins to prevent trapping. Bobbins are also very often placed on a bed of cotton felt, which is so soft that is rises all around the bobbin, and any yarn which is not required for the moment in knitting rests on this pad in such a way that its trapping underneath the bobbin is prevented. It is a neat and effective solution of a great difficulty. When the pads become too much compressed, so that their power to rise is reduced, they are replaced with new ones at small cost.

In making random marl yarns, where such a slight twist has to be imparted to a rayon thread in two colors, one bobbin is placed under the other so that the thread of the lower bobbin comes through the center opening of the upper bobbin. In this way, the yarn from the upper bobbin winds itself around the lower thread in a random twist with less than one turn per inch. This simple device has effected a considerable saving on the former method of double winding. By superimposing one bobbin on another, the random twisting is carried out in an economical plan, the only outlay being in the matter of a platform to house the two bobbins, which sometimes restricts the length of the bobbins which can be used. It is certainly a method which is well worth trying out. In some cases it is necessary to keep the lower yarn on a smaller yarn package and to raise the platform on which the ordinary bobbins rest. The bobbin bore must of course be perfectly smooth to allow the rayon thread to pass through.

Manufacturers are wondering what the next demand will be for the auxiliaries that have been developed for use along with the rayon stocking. For winter wear, the ankles are kept warm by what are termed "footlets," which are worked in wool and extended over the ankles. The present season also has seen, for tennis and other sports uses, what are termed socklets, knitted also from wool and intended to absorb the perspiration of the feet and to minimize the direct friction with the shoe of the wearer. After experience of those adjuncts it is feared that there will be some kind of reaction against them. To provide for this, makers are providing a full range of hosiery with rayon on the surface, plated with wool next to the skin. These grades have made progress and it is certain that they will be further developed during the coming autumn and winter, so as to render the winter rayon article self sufficient.

Warp Knitted Fabrics

In intermediate garments rayon is still a prime favorite, particularly with women's wear. Milanese fabric still holds the chief place in such articles, worked in white and in fine gauge. It remains a comparatively dear fabric, however, but is largely employed for vests and particularly knickers. Quite a brisk demand has manifested itself for sewing machines which seam the ends or legs and insert elastic at the same time. Rayon of course is used for the seaming material and there has been a large extension of the use of this material for joining garments, and also for ornamenting them by means of the sewing stitch. The milanese texture in the costlier grades has many imitators in the cheaper varieties.

Fancy Outerwear for Women

In fancy fabrics for ladies' costumes, rayon figures prominently. One class is made on fine-gauge circular jacquard machines on the plating principle, where acetate and viscose rayons are used for the ground and the design is afterward developed by cross-dyeing. Such goods have experienced a brisk demand in floral styles and in geometrical figures. The designs are somewhat restricted in form as you have to make the changes in terms of three needle widths; if smaller points are sought they do not appear on the face with certainty. In such goods the contrast in coloring is generally subdued. Designers are now employed by the large firms for new patterns, while the smaller concerns content themselves with selections from the works of consulting designers who offer their creations several times a year. These designs are then transferred to squared paper and sent to the machine maker to be cut. Firms are also now developing their own film cutting, so as to render their whole activities perfectly private and independent.

Other fabrics are in the finer gauges with about 10 to 12 needles per inch. The ground is usually developed in woolen material, with the design worked in rayon on this foundation. The stitch is one and one rib, the designs are clearly defined, and the rayon serves to brighten up and lend charm to the whole aspect.

Rayon is also being used very largely for the lace and trimming edgings used for undergarments. Manufacturers of rayon garments in color now preserve their waste pieces and have them made up into attractive garters which have been very popular with ladies. This rayon knitted material is used to cover the rubber bands which are the foundation of this branch of the industry, and this activity spells quite a nice item of profit. Braid manufacturers are not entirely satisfied with rayon as a material for use around the edge of an article, as it is found that most types are rather too rigid to curve completely around an edge and give a neat effect. For this particular purpose they have still to adhere to the more pliable materials formed in use.

On the other hand, the maker of millinery fabrics has pounced on the artificial horsehair materials for use in his branch, where rigidity and stiffness, combined with luster or attractive sheen are outstanding merits. This yarn is being spun by the cuprammonium process in single filaments of about 200 or 300 deniers, and several of these are worked together in the needles of the knitting machine. German manufacturers have had much success on this for a considerable time, but others are now producing satisfactory fabric as well. The machines have to be specially adjusted for this branch and particularly the ballooning of the threads has to be carefully controlled or the stitches will "jump" the needles. It is rather refractory to deal with, and softening and lubricating agents only serve to increase its stubbornness.

Wonders can be produced in this respect by altering the thread guides so that jerkiness in the draw-off from the bobbins is avoided. Knot tying is a great difficulty and the best plan is to deal with each of the single fila-

ments separately, tying them in different places so that the knots reach the needles at different parts. In this way the bulk of the knot is effectively distributed so as to be negotiable. It is a strain on the needles, the cost from this side being appreciably increased over ordinary fabric. The finished fabric delights the heart of the milliner because it stands up erect and stiff and forms a suitable ground on which other softer elements can be mounted.

Rayon and Angora Fur Mixtures

Manufacturers have found that very attractive effects can be produced by using rayon yarn along with angora rabbit fur, in which a number of English and French manufacturers are now specializing. The fur fiber is often mixed with a certain percentage of wool, which renders it more spinnable and minimizes the shedding of fibers peculiar to this material. There is something very much akin in the rayon sheen and the characteristic appearance of the angora fur fiber, and the resulting fabrics have attained a high place among the specialties offered by the knitting industry; ladies' coats, shawls, and a large range of children's garments are now obtainable in such mixtures. The rayon is usually introduced in the form of stripes with the fur material.

A number of manufacturers still experience much difficulty in making warps for warp-loom knitted fabrics. The warping creel supplied by makers is often unsuitable for rayon because of the way in which the yarns get trapped when the cylinder is stopped. It is all right when the cylinder is revolving at full speed, but when it is checked or stopped, as it must be at the end of each section, the threads have such a momentum that they continue to fly from their bobbins for a yard or so until they slow down. This slack material drops and gets trapped on the bobbin base, or elsewhere, thus causing delay before starting up again.

The writer has just had one of these creels fitted with a series of ball drags which is proving very satisfactory in use. The threads are each made to pass into one of these drags, which consist of a steel ball housed in a casing in such a way that it always rests on the thread and effectively tensions it. There are various sizes of balls, according as fined or coarser deniers have to be worked, but there is an average size and weight which proves satisfactory for the run of counts in general use. These ball drags have also been applied with success to knitting machines for the same purpose, and give very satisfactory results.

Rayon in Laces and Trimmings

(Contd. from page 115)

This yarn has been used by the many branches of the trade almost since the beginning of the use of rayon. This yarn consists of three strands of 150 denier, to which two to three right-hand turns have been given. Three of these threads are then doubled with six to seven turns of left-hand twist. The final result is a yarn having the general appearance of a cable yarn, yet at the same time it is very soft, clean and pliable.

Still another yarn is used for patterns where only a spot of rayon is desired. This is sold as 10/2 rayon, so-called because it is made up of 10 strands of 150 denier. This 10-ply yarn is given three right-hand turns of twist and then doubled with four turns of left-hand. A yarn not unlike the 3/3 is the result. The main difference, of course, is the diameter of the yarn, which varies between $\frac{1}{32}$ and $\frac{1}{16}$ of an inch. This same yarn can and frequently is made by doubling two strands of 5/300. Practically the same effect is produced, the only difference being that the yarn made from 150 denier is a little bit softer.

The lace and narrow fabric trade have, almost exclusively, used rayons of the viscose process in preference to the various other types now marketed. To me there does not seem any real reason for the almost exclusive use of this process rayon. In fact it would seem that price, availability and ease in dyeing all play a part.

Of course the use of color in anything today is not news. But the fact remains that with the introduction of rayon into the lace and narrow fabric industry, colors in fabrics took an upward leap. Cotton did not offer the wide field for clear, bright colors so noticeable in the all-rayon articles of today. Brightness coupled with fastness has been a big factor in increased sales.

Rayon has been largely responsible for rapid movement of patterns, newly marketed. The style factor enters into this merchandise so strongly that the women of today, no matter where located, are eager and anxious to accept the bright, clear, attractive colored laces and narrow fabrics in preference to the plain, matter-of-fact merchandise of the "white-ivory and ecru" era.

The demand of the public is always for that which is different. All manufacturers are keenly aware of this and the new lines being shown feature practically nothing but all-rayon trimmings and laces. For in this material they have found the greatest possibilities. This type of merchandise naturally is not of the staple variety and care is always exercised in its manufacture.

The fact that rayon trimmings are so much of the style variety is what appeals most to the trade. Trimmings and laces are subjected to very little wear. When obsolete in design and color, replacement results. These replacements, together with constant introduction of seasonable colors and patterns, bring to manufacturers a much more steady flow of business and enable them to continue production at a higher rate through the usually slack season.

It would seem that rayon in this industry is here to stay. It presents a field in a low priced market to offer merchandise that has all the appeal of silk without the attendant costs or high prices. If there are any ways in which rayon has not been used in making up narrow trimmings and laces, most manufacturers are unaware of it. Notwithstanding this, any possibilities that present themselves are thoroughly looked into and future lines may even see a wider and more varied use of rayon.

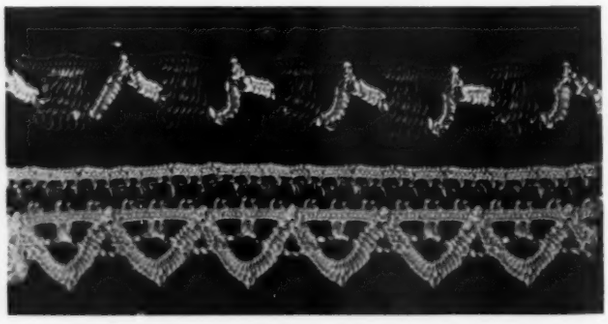


Fig. 4. New Barmen Trimmings Using Varied Ply Yarns for Novel Effects

RAYON
in
Men's Underwear

This Use Is a Feature in the Knit Goods Trade

RAYON made significant progress in the knit goods industry thus far this year, both as regards extension of existing markets, and the invasion of new fields. A steadily growing popular acceptance of textiles made from synthetic yarns encouraged the manufacturers of knitted underwear and hosiery to expand their lines. The technical progress toward the production of finer quality rayon also helped in this direction, by making possible the manufacture of higher grade garments which allowed for a gradual trading-up in price and a stronger emphasis on the style appeal.

Men's rayon underwear is not yet a volume proposition. However, the progress which has been made in this branch of the trade is potentially significant.

Throughout the knit goods industry, new outlets for synthetic yarns are being created —and old uses revived and revised to meet present-day style trends.

Production of women's rayon undergarments had already assumed significant proportions, when the year opened, and the production of men's rayon underwear was rapidly developing from an infant industry into a division that represented important business. The growth of the men's rayon underwear trade, indeed, was one of the features of the year in the rayon industry. Firms which had ventured timidly into this field found a prompt, even enthusiastic, market. Men were readily sold on the advantages of rayon underwear. The demand has grown consistently month by month. Mills responded to the increased call by expanding their plants, and augmenting their output. Numerous new companies were organized; and now we find the men's rayon underwear industry so extended that it represents one of the potentially important channels of rayon yarn consumption.

Men are attracted to rayon underwear for its light weight, its coolness in summer, and its softness when contacting with the body. One of the chief sales obstacles in developing this market, had been the reluctance of men to wear undergarments made from the so-called "feminine" textiles; and when rayon underwear was first offered, the industry found that this prejudice produced a serious sales resistance. The rapid growth of demand during 1929 was conclusive evidence that this problem has been solved.

With respect to the women's market, the year was marked by no radical developments; this division is solidly established, and both output and sales show a steady, fairly consistent increase.

Progress in Hosiery

There were significant signs of progress evident in the hosiery industry. Rayon is still a step-sister of silk, so far as women's full-fashioned production and demand are concerned, but it has received a much more cordial welcome from the men. Rayon is rapidly winning popularity in the half-hose field. Rayon half-hose has been moving with regular strides from the lower-end to the medium-price field; during the current year 50c. and in some cases even 65c., rayon hose were selling extensively among men. One producer went so far as to announce a $1 silk-and-rayon half-hose number. However, the volume of rayon half-hose business is still at the lower-end. These lines, and also the children's rayon hosiery lines, were well received during recent months and represented a satisfactory turnover to the knitters. The children's hosiery numbers were especially attractive; numerous new and distinctive designs were offered and won wide acceptance.

But these divisions of the rayon consuming market were established some time ago. What then of the newer and renewed uses for synthetic yarns in the knit goods field? Giving a glance over the industry, we find that 1929 is noteworthy on several points.

Renaissance in Outerwear

The market branched out in various directions during the year. Rayon found increasing acceptance once more in many divisions of the outerwear industry. It is being developed as a textile for golf frocks, sweaters with ensembles, beach capes, bathing-suits and bathing-suit ensembles, mufflers (both men's and women's) and smart millinery. Knitted rayon hats represent a market of real possibilities. Numerous striking models were created by the leading Paris designers, and are now being promoted in this country. At present, this business could not be called extensive, but it has promise of development.

The current keen interest in everything pertaining to beach apparel, and the remarkable business being enjoyed by bathing-suit manufacturers, lends particular timeliness to the new rayon bathing-suit models. A wide range of pleasing color combinations has been designed, which are winning more friends for synthetic textiles.

The growth of rayon yarn consumption in the knit goods industry is divided among a constantly widening range of fabrics. All-rayon knitted cloths are popular;

(Contd. on page 139)

RAYON SEWING THREAD,

Although It is Commercially Unimportant Now,

Has Real Future

Just the fact that rayon sewing thread is actually on the market, is regarded as significant by the author of the accompanying article. He realizes that there is a long pull ahead but finds general agreement that eventually this use for rayon will be an important one.

RAYON sewing thread is now on the market. That doesn't mean that it offers any immediate or even fairly distant challenge to the supremacy of silk sewing thread. It is recognized and accepted by both rayon and yarn producers and sewing thread manufacturers, that the synthetic fiber still has a long way to go, before it can offer any formidable competition to the product of the silk-worm. The significant fact, however, is that victory has at last crowned the efforts of the rayon industry's chemists, to the extent that rayon sewing thread is now an actual commodity.

Potentially, it might be said that the improvement of rayon thread to the point where it has become marketable, is one of the features of the year in the development of new uses for the synthetic yarn. After a long period of experimentation, rayon producers a little less than a year ago, were able to offer the thread industry a yarn suitable for thread. During 1929, several of the principal thread manufacturing firms, decided to include rayon thread among their products. Now, six months after the first appearance of the thread, it is interesting to survey this market as it has developed to date.

The attitude of the thread manufacturers on the subject might be epitomized as follows: Rayon thread is still an experiment. They put it on the market, not with the expectation that it would supplant any or all of their other thread lines, but primarily because they wanted their lines to be complete, and up-to-the-minute; and this policy demanded the inclusion of at least one rayon thread number. The sales results to date have been scarcely more than nominal; in justification to rayon, however, it should be added that the thread producers have done little active promotion of this product. They admit quite frankly that they do not see the use of promoting rayon thread. It cannot compete with silk thread, as yet; it lacks many of silk's most valuable qualities for sewing purposes, they state. It has luster, a fair amount of strength, but it lacks elasticity. It hasn't the strength of silk when wet, and in other practical ways it falls far short of the silk sewing thread standard. Such is the attitude of the sewing-thread manufacturers, as gleaned by the writer in an extended round of interviews.

Interested in Potentialities

These firms are all keenly interested in the potentialities of rayon thread, however, and they are merely waiting for the perfection of a rayon yarn which they feel will justify active promotion. The trade appears to have little prejudice against the synthetic fiber, and it is also significant that their consuming market is not especially swayed by antagonism in that regard. Such rayon thread business as has registered to date, comes from various groups, and mostly in an experimental way.

Price Factor Important

The financial end of the proposition is of particular interest to the garment manufacturers. The whole cutting trade is fighting to get the cost of production down; any thread that would give the service of silk at lower cost naturally would be welcomed. The price of rayon thread, of course, is lower than that of silk, and this would stimulate demand, if the two were even approximately of equal strength standard. One cutter who was questioned said: "When the thread is right, and the price is right, we will buy rayon thread. We have no prejudice; it is entirely a question of standard."

Obviously enough, thread producers differ in their views of the new product. One factor didn't believe

rayon would ever take the place of silk for sewing. Another, more cautious, thought that rayon thread would become important in the market eventually.

One thread manufacturer who includes rayon in his lines, said he found the consuming market only moderately interested. He added that he could not conscientiously sell the synthetic product as "as good as silk," but he was offering it for use in conjunction with rayon fabrics. This firm also found the price factor important. They are selling rayon at a considerably lower figure than silk, and garment manufacturers are interested in it from the viewpoint of economy. Numerous ready-to-wear manufacturers commented on the low cost of rayon thread, stating that they would be glad to use rayon, if it served the purpose.

Attitude of Rayon Producers

Rayon producers who sell yarn for thread manufacturer tell a somewhat similar story. The demand for this yarn is small, but it has shown some growth during the year. One of the chief producers of rayon yarn for this purpose said his thread-yarn line was confined to one size, 75 denier. He explained that the manufacture of thread-yarn requires no extra equipment at the plant, a special process being all that is necessary. This company is now in a position to make any quantities of yarn for thread manufacturer, but they do not anticipate a demand that will call for anything more than very limited output.

Both producers and manufacturers are agreed on one point—that is, that rayon thread has a real future. The fact that it is now on the market, though only nominally, means a big step forward. Its actual appearance in the lines of the thread manufacturers has started to win the attention of the thread consuming industries to rayon's possibilities in this field. The chemists in the rayon plant laboratories are constantly working to produce a more durable, stronger and more elastic yarn for thread manufacture. As one rayon producer put it confidently, the perfection of a rayon thread which meets all sewing thread standards, "is merely a question of time."

Making Rayon Sewing Thread

New Achievement for the Synthetic Fiber Industry

By H.S.E.

A NEW field, the manufacture of sewing thread, has been entered by rayon. Although rayon sewing thread may not displace the regular pure silk machine twist, or sewing thread, yet it is logical to assume that it is going to make more or less inroads into silk thread sales. Realizing this fact, several of the larger silk thread makers are ready with a rayon sewing thread that will be a good substitute for silk. The size is the usual one (*A*); the yardage is the same as the regular retail spool or silk (50); and the product is made in the regulation black and white, and a variety of colors.

The direction of twist is as follows: For the first-time twisting, counter clockwise; for the second-time twisting, clockwise. There is some variation in the turns per inch used, the put-up being

	A	*B*	*C*
First-time twisting	14	10½	18
Second-time twisting ..	10½	12	15

The deniers used are 85, 95, and 105; the bulk being 95. The manufacturer who makes his thread from 85 or 95 denier rayon classes his output as *A*, and it is sold at 50 yd. the spool. At 95 deniers, the resultant deniers for the finished thread comes to about 285 deniers, and this size approximates the 6-cord cotton sewing thread which is retailed as size 50; a very popular number.

Although rayon sewing thread can be made of various combinations of turns per inch of twist, each of which will produce a strong and well appearing thread, there is one point that should not be overlooked; that is, the cost of twisting the thread. To give a concrete example of the

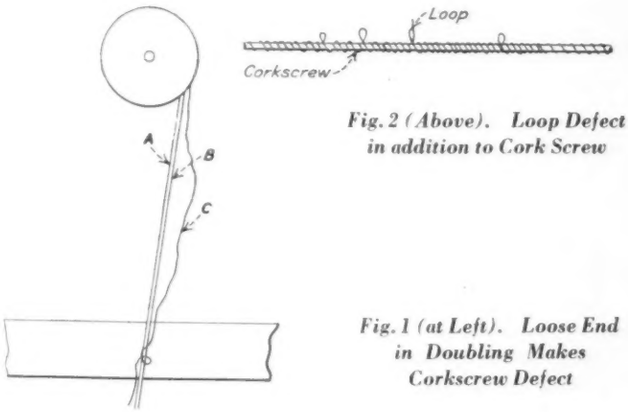


Fig. 2 (Above). Loop Defect in addition to Cork Screw

Fig. 1 (at Left). Loose End in Doubling Makes Corkscrew Defect

effect of the turns per inch on the production, let it be assumed that a regular silk up-spinner adapted to rayon is used, with the spindles rotating at 10,000 rev. per minute. It is a simple matter to figure out that, with the spindle speed the same in both cases, a twist of 10 turns per inch is going to turn out 50% more production than a twist of 15 turns. Or, to put it more clearly, by means of a formula:

10,000 ÷ 10 = 1,000 in. per minute delivered by each spindle when the twist is 10 turns per inch.

10,000 ÷ 15 = 667 in. per minute delivered per spindle when the twist is 15 turns per inch.

The importance of bearing the above in mind when making rayon sewing thread will be realized if we return for a moment to the combinations of twist already cited, *A*, *B*, and *C*. Adding together the first- and second-time twists in each group, we discover that *A* and *B* do not differ greatly, *A* having 24½ turns, and *B* having 22½ turns. But in *C* the total twist runs up to 33. The deduction logically made is that the combination *C* will give only two-thirds the production per spindle per minute that combinations *A* and *B* will give. This is a costly handicap unless the user of the twists in group *C* can level the disparity in costs at the other processes.

The process of making up the sewing thread runs along the following line: skein winding, first-time twisting, doubling, second-time twisting, reeling, dyeing, skein winding, spool winding. There may be slight departures from this routine, according to the ideas of the management and the type of machinery available, but in general there is much sameness.

Obviously, whatever machinery is used there is constant need of care in holding faults down to a minimum. One vexatious defect that crops up is corkscrew. This fault comes about through one or two of the three ends sagging, the loose end or ends forming the corkscrew

effect when they are twisted. Irregular tension or poorly filled spools cause the majority of faults of this type. Occasionally, however, a faulty spool which rotates in jerks will cause the same trouble when the doubling is done on the twister. Fig. 1 illustrates the manner in which the trouble starts. Threads *A* and *B* are correctly tensioned, but the slackness of *C* inevitably makes corkscrew or uneven thread. Sometimes when the sagging of an end is exceptionally pronounced, a snarl or loop is produced in addition to the corkscrew, as shown at Fig. 2.

Single constitutes another fault that is apt to give trouble. When doubling is done on the silk type of twister adapted to rayon, the drop or detector wires which operate the stop motion may get out of order and cease to function properly. On cotton or wool twisters, where no stop motion exists, single is apt to occur and run quite a while before the operative becomes aware of it. Whatever the cause of single, waste and loss of production will result unless continual alertness is exercised to eliminate it. The waste occurs because the single will have to be removed from the spool or bobbin. The loss of production occurs because of the time spent while the single was running.

Double is made when an end from one set of spools gets attached to the ends of an adjacent set, thereby causing the latter to carry the extra end. In a case of this kind, the remaining ends from the first set will continue to run to the bobbin or spool, making a single, so that there are two different faults on adjacent spindles. On the cotton or worsted twister, double may be caused by excessive ballooning due to new or light travelers. In this instance, the double is composed of six ends.

Broken filaments constitute another imperfection in rayon thread making. A fuzzy, hairy appearance ensues which detracts from the appearance of the thread. This fault may be made on any of the machines used. It generally comes about when the end or ends run over a sharp or rough edge or surface, which results in a severance of one or more filaments. Only the most painstaking and systematic inspection of the parts or surfaces over which the ends run, or pass, will remove this danger.

Cut travelers on ring twisters can injure the yarn and there should be a set time allowance for renewing the travelers, which will be well within the period required to cut them. Rings that need greasing or lubrication should have this operation performed properly and at the right periods to prevent damage to the travelers, the rings, and the thread.

Rayon-Wool Duvetyn

(Contd. from page 117)

these yarns slackly twisted together, as already described.

The goods are dyed in the piece with a wool dye which does not affect the rayon, leaving it in its original white color. After the fabric has been napped, the blending in of these white rayon fibers with the woolen fibers, which in this sample are dyed to a wood brown color, presents to the eye a very soft, fine, and agreeable mixture effect. As the wool-and-rayon filling is a mixture of brown and white, while the warp is all brown, it follows that in a structure of this kind the warp, with its different and darker color, influences the color aspect of the face. Therefore, with the weave that has been employed, the surface of the goods, in addition to the mixture effect already referred to, presents to the eye an all-over mottled effect of a somewhat subdued character, differentiating it strongly from the aspect that it would have if made entirely of one kind of material, and of one color. The handle of the cloth, also, is much silkier than if the fabric had been made entirely of wool.

Four-Harness Broken Twill Weave

The weave is a four-harness sateen, which in effect is really a broken twill, as shown in the illustration. In this weave, on what would ordinarily be the back, the filling floats over three ends and is caught by the fourth; while on the face the warp similarly floats over three picks and is caught by the fourth. The side on which the filling predominates is used for the face as in the gigging the nap is raised from the filling threads.

To secure a good nap on a Duvetyn requires excellent napping equipment, and great care in processing to avoid damage to the goods. It is customary to nap the pieces several times, say five runs, more or less, raising more and more nap each time. After each run the goods will be slightly cropped on the shear. In these treatments the goods contract in width considerably. The nap is short and dense, covering the face of the fabric completely and giving it a fine, velvety appearance.

Duvetyns made of different kinds of materials have had a large sale in the past. The great bulk of such fabrications have been made with spun silk filling, from which the pile is raised in the napping, and with a warp made of cotton, spun silk, or organzine, the spun silk used for the filling being two-play. All-cotton Duvetyns have also been made. These various constructions have been piece dyed.

The fabric which this article deals with is the first instance that has come to the attention of the writer where rayon has been combed in with wool for use as a filling material. The effect obtained by this method of construction is both interesting and pleasing. Single yarns have not been found suitable for fillings in Duvetyns, as the napping robs them of so much of their strength that there is great risk of the goods becoming tender filling ways. To obviate this, two-ply yarns are generally used for the filling, so that as one part of the thread is robbed of some of its material, there is under it the untouched part of the other thread to give the necessary strength to the cloth. In the fabric with which we are dealing, a three-thread yarn has been used which assures proper strength to the fabrication.

In this structure a wide veriety of mixtures, or shadings of color, are available for the manufacturer. Instead of the rayon which is used in the blend being of all white, it may be dyed to any suitable shade. Furthermore, the artificial silk may be dyed into two or more shades, and after these are thoroughly mixed up together they will be blended into the wool, and a "melange" or mixed-color effect will be the result. Two colors of wools can be used with the white rayon, or dyed rayon, to have it differently colored.

There would seem to be an opportunity for American manufacturers, working in close association with fine worsted-yarn spinners, to develop constructions of fine wool and rayon mixture yarns, and the fabrics made from them, along the lines of the filling in this French material. Of course it is not a thing that can be done over night, and the expense would not be small. The fabric that we are discussing being offered at retail in high-class New York establishments at $11.75 a yard, 54 in. wide, the cloth in this width weighing 9⅝ oz. per yard. At such a figure there is certainly an ample margin of profit for the manufacturer of the goods.

Rayon Waste Market

Approaches a Turn of the Ways

A STEADY increase both in production of, and demand for, staple was an outstanding feature of the year in the rayon waste industry. The trend toward staple, or manufactured waste, was evident when the year opened, but only in a limited degree. Developments through the spring months served to help the promotion of this new product. Rayon waste grew steadily scarcer, the quality of waste available was far from perfect, and the difficulty in procuring good-grade waste sent prices upward. The demand for waste was active up to early summer, and a satisfactory turnover was reported by the principal dealers. The volume was about equal to that of the preceding year.

With the advent of summer, the rayon waste market suffered its normal "dead season" slump; demand shrank to inconsiderable proportions; and the market softened somewhat. There was no real price weakness, due to the scarcity of waste available. Dealers were not at any great stress to clear, and the usual strong impetus to sharp price-cutting was absent. With the opening of the fall season, the market strengthened again, and the outlook for the winter was promising.

It seems evident now that the rayon waste industry is approaching a turn of the ways. The constant improvement in the methods of producing rayon yarn has cut sharply into the annual output of waste. More and more rayon producers are discovering ways of either eliminating waste, or—as happens more frequently—utilizing the waste themselves. This trend applies both to the European and American producers. It had already assumed significant proportions last year, and was a topic of some concern in the waste industry. The development of staple was a natural outcome, and the prospects are that any further scarcity of rayon waste will serve to stimulate and develop the staple market.

Two Lines Do Not Compete

Rayon waste dealers now handle both waste and staple, but the two lines do not compete, due to disparity of prices. Staple is still a costly proposition; its prices this year averaged 25% more than rayon waste proper. The consumption of staple, while growing steadily, is held back by the price element. Factors who were questioned said they thought the development of staple was a good thing for the industry. It is obvious that some readustment will have to take place, if staple is eventually to supplant waste, as staple costs more to produce and commands a higher figure in the market. Another significant point is that staple, should it really become a big factor, will have a market position parallel to that of rayon yarn, very much as spun silk relates to thrown silk.

The outlook for staple is still difficult to forecast, but the volume of this business has risen at a surprising rate this year; one firm which enjoys a big turnover in waste, was reported to be doing a staple business equal to 15% of its total volume.

Another feature which would seem to argue a good future for staple is the wide complaint heard this year in the consuming market regarding the difficulty about getting adequate supplies of good grade waste. This difficulty is due to the fact that some rayon producers do not separate the fine from the coarse waste. The mixed waste is not suitable to converters' uses, for the most part, and frequently it is sent back, when shipped. When the fine and coarse waste are kept separate from each other, the product brings higher market prices.

Imports held more or less to standard through the winter months, but in April and May, customers began to protest; it was contended that the waste arriving from Europe contained all sorts of foreign matter; that lengths were uneven, and that the waste as a whole was below the usual standards. Apparently there was considerable inferior waste on the market; buyers, who had had experience with it, shied away, and dealers found their stockrooms filled wtih unmovable goods. Price-cutting was resorted to, to effect a turnover. This underselling had little effect on the waste market as a whole, for two reasons: First, good waste continued scarce; and second, manufacturers who sought quality, were obliged to buy ahead, always at list prices or above.

Year Has Been Satisfactory

Dealers in high-grade waste have had a very satisfactory year, thus far. The steady rise in prices, however, presents a problem to the trade. Converters and manufacturers complain that the high cost of waste is cutting their margin to a point where it is scarcely profitable to continue using that product. Indeed, this presents a paramount issue at present. Will the high cost of waste result in many firms turning away from this field, and utilizing other fibers in more profitable production? Factors who were questioned said they thought such a development was not unlikely, but they added that they did not look for any early movement in this direction; the turn away from rayon waste, if it should materialize at all, would be a slow process, it is believed. Furthermore, a drop in demand invariably brings a drop in prices, so waste dealers argue that the mechanics of the market will keep waste from going too high.

At present, certainly there would appear to be no occasion for worry on this score; waste has an important and clearly defined place, and the constant discovery of new uses for rayon's by-product serves to widen the market and add to its value.

In all, the waste market outlook at the opening of the fall season was satisfactory. Sellers are in a strong position, and the uses for waste are steadily increasing Just what relation the development of staple will have to waste consumption, it is impossible to say, as yet. However, the trade feels that in staple it has a good recourse, should improved rayon production methods finally reduce waste output to a negligible point. It is confidently believed that there will always be a market for either waste or staple, and that between the two the trade need have no worry regarding future sources of material.

Recent Developments in . . .

Processing Cotton-Rayon Piece Goods

By Winn W. Chase

IN PREVIOUS articles (TEXTILE WORLD, Oct. 9, 1926; Jan. 29 and Feb. 26, 1927; and Sept. 29, 1928) the writer has described in some detail the methods and equipment used in processing cotton-rayon piece goods. While the practice of bleaching, dyeing, and finishing has undergone no fundamental change during the past year, there have been developed some important improvements in machinery and technique.

Desizing, Scouring and Bleaching

The importance of thoroughly desizing cotton-rayon fabrics before bleaching, to produce satisfactory results in dyeing and softness of feel in the finished goods, is better appreciated. Two of the well known products suitable for this operation are now available in improved forms which facilitate greater ease and economy in application; Polyzime P now being marketed as a concentrated dry powder, and Diastafor as a thin-pouring liquid.

For scouring, a number of new detergents and bleaching oils have been introduced. To replace olive oil soap the use of olate flakes having a titre of less than 14 degrees has been recommended; Solutions or emulsions of olate flakes may be kept in the cold indefinitely without jellying and when used for scouring may be rinsed quickly and thoroughly from the goods. An improved machine for scouring is the French boil-off; this apparatus is equipped with ball bearings throughout, thus reducing the tension on the cloth to a minimum.

The methods employed in bleaching have not been greatly modified. Hughes has described a semi-continuous bleach for cotton fabrics containing rayon effects which consists of boiling in an open kier with neutral soap solution; and then running the goods continuously through a series of slack washers, J-boxes, and Gannt pilers, where they are washed, chemicked, soured, and washed. Activin, an organic compound containing available chlorine, has been used in Europe for desizing and bleaching and is now manufactured in this country. Solutions of Activin are extremely stable and it is possible to procure a light bleach with this product without causing tendering or harshness of the fiber. The goods are treated for one-half hour at 145-160 degrees F. in a 3-4 degrees solution of Activin, rinsed and antichlored. By adding small amounts of acetic or formic acid the bleaching action is accelerated.

Increasing Strength of Rayon

It is well known that one of the most serious defects of rayon is its low tensile strength when wet. To increase the strength it has suggested to treat the fiber with a wide range of chemicals including formaldehyde, lactic acid, aluminum acetate, coniferin, soap, chlorine, etc. Despite these experiments no improvements worth mentioning have been made in improving the strength. In fact, the reason for the loss of strength of rayons when wet is not known and until the cause for tendering is ascertained there is little probability of finding a remedy.

Improvements in Dyeing

The tendency for rayon to dye unevenly is due to variations in method of manufacture, ripeness of the alkali cellulose or the viscose, condition of the precipitating bath, age of the goods, tension at which spun, variation is denier and filaments, etc. Slight differences in the yarn which are not discernable in the white become more pronounced when the fiber is dyed, and in the case of piece goods is manifested in the form of filling bars, striped warps, and streaks. Various methods have been proposed to correct the unevenness in fabrics containing rayon which have been dyed with direct colors. Courtauld's, Ltd., have protected a method of after-treatment which consists of treating the fabric for 30 minutes at 195 degrees F. in a bath containing one pound of beta naphthol and one pound of common salt to 10 gallons of water; following this the goods are worked in a warm soap solution to remove the beta naphthol and are then rinsed with warm water.

This method, which is useful only with direct colors, is said to give a marked improvement in most cases. It appears to the writer, however, that the after-treatment described is of limited application due to the fact that the treatment with beta naphthol at a high temperature, followed by soaping and rinsing, would tend to remove some of the color from the fabric and thus make matching of shades extremely difficult.

It is known that all dyestuffs are not equally sensitive

to changes in the structure of rayon and, by selecting those colors which are the least sensitive, uneven dyeing may be largely overcome. Several methods have been developed for determining the suitability of direct dyes for dyeing viscose. Whittaker's temperature range test indicates that dyestuffs having the maximum affinity for viscose at 68 degrees F. give the most even dyeings; those having the greatest affinity at 122-140 degrees F. are less even dyeing, and those with a maximum affinity at 194 degrees F. give the most uneven results. Although the colors which possess the greatest affinity at 68 degrees F. give the most even dyeing, it is not necessary that these dyes should be applied at that temperature, and in fact, Hoz recommends that to prevent unevenness viscose should be dyed at the boil.

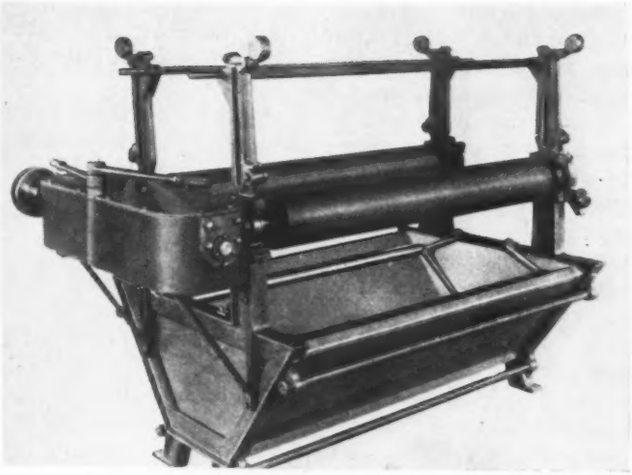
A quicker method of testing the suitability of direct dyes, which has been described by A. J. Hall, depends upon the fact that alkali-treated viscose has an increased affinity for uneven dyes and the same affinity for even dyes as has untreated viscose. To perform the test two samples of viscose, one untreated, the other having been treated for four hours in a 5 degree solution of caustic soda, then washed and dried, are dyed together. If the two samples are dyed to a uniform shade, an even dyeing dyestuff is indicated; if the alkali-treated sample is considerably heavier in shade, an uneven dyeing dyestuff has been used.

Tede points out that multi-filament viscose yarns show the greatest tendency toward uneven dyeing, while cuprammonium rayon is the most even dyeing. Cuprammonium, which has the greatest affinity for direct colors of any of the rayons, should be dyed without the addition of salt except in the case of very dark shades, when salt may be added towards the end of the process. The presence of alkalies in the dyebath is to be avoided as these cause uneven dyeing of cuprammonium rayon.

To assist the dyer in producing even shades many of the dyestuff manufacturers have either selected from their range of colors those dyes which dye most evenly on rayon, or have developed a new line of dyestuffs particularly adapted for securing level shades, even on rayon in which various portions have different affinities for the ordinary direct colors.

Basic Colors on Rayon

A new product, Auxamine B, has recently come into prominence for the after-treatment of rayon which has been dyed with basic colors. This product is of value in increasing the fastness to light of most basic dyeings. The fabric, after mordanting with tannic acid or Katanol, is dyed in the usual manner and after rinsing is treated for ½ to ¾ hour at 75 to 85 degrees F. in a bath containing 2-5% Auxamine B (on the weight of the goods), together with 2-3 lb. of common salt and the same amount of 10% acetic to 100 gallons. The goods are extracted and dried without rinsing.



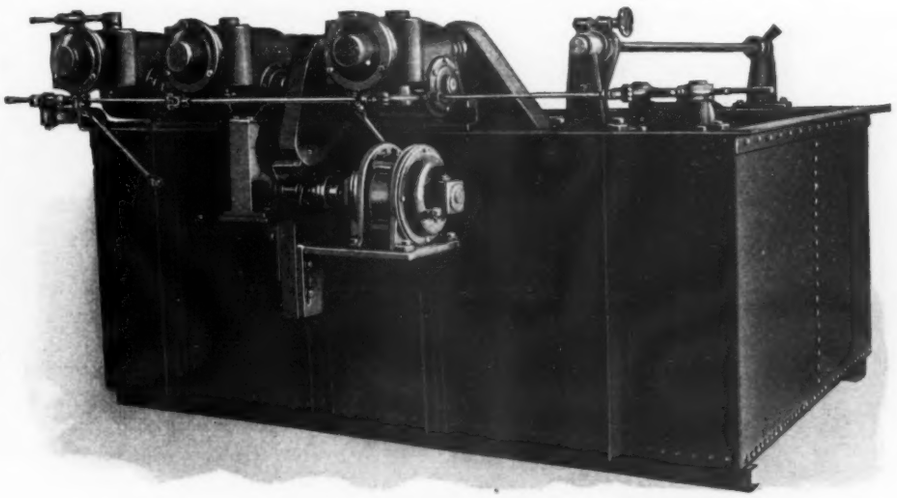
Motor Driven Jigg for Rayon; Ball Bearings Reduce Tension

To assist in the absorption of basic dyestuffs when used on acetate rayon the use of pyridine and its hydration products, such as piperidine, has been patented. Considerable experimental work has been done on the effect of hydrogen ion concentration in dyeing of rayon, but as yet no definite conclusions have been reached.

Dyeing Acetate Products

A large number of new dyestuffs for acetate have been developed, many of which are now available in powder form. The range of shades and concentrations have been increased to a point where most shades can now be produced on fabrics containing acetate at a reasonable cost, practically the only lack at present being a good direct-dyeing black.

In dyeing mixed fabrics containing rayon or cotton, together with celanese, it has been found advisable to first dye the celanese, adding the S.R.A. colors in small



French Boil-off Machine for Scouring

portions to reduce the staining of the cotton or rayon to a minimum. By following this procedure it is stated that a light rinse in warm soap solution will remove practically all staining.

For dyeing drapery fabrics, curtains cloths and other materials requiring exceptional fastness to light, selected colors in the S.R.A. range may be had which will withstand 60-100 hours in the Fadeometer without showing appreciable change in shade.

To increase the penetration of the water insoluble dyes on acetate, the use of ammonium thiocyanate has been suggested; while to produce full and brilliant shades with Naphthol A. S. the addition of urea, or one of its derivatives, to the padding bath has been recommended.

The Indigosols, which are leuco compounds of vat dyestuffs, and have the same fastness properties as the colors from which they are made, are becoming of interest to dyers of fabrics containing rayon or acetate yarns.

Cotton has shown that according to the method of application, it is possible to dye the cotton and viscose, leaving the acetate white; dye the acetate and cotton in same or contrasting shades; or dye the acetate rayon leaving the viscose and cotton white. To dye the cotton, leaving the acetate white, the goods are treated with an Indigosol and sodium nitrite and, without steaming developed in an acid bath; the Indigosol is not fixed on the acetate and is washed off. To dye the acetate, leaving cotton or viscose white, the fabric is treated with an Indigosol and nitrite and steamed to fix the Indigosol on the acetate; the goods are washed to remove the Indigosol from the cotton and viscose and then the color is developed on the acetate in an acid bath.

To produce the same shade on cotton and acetate, the fabric is treated with an Indigosol and nitrite, steamed, and developed in an acid bath without previous washing. To dye the two fibers in contrasting shades the cloth is treated with an Indigosol and developed, without steaming, to first dye the cotton, and then treated with a second Indigosol, steamed, washed, and developed to dye the acetate.

Two improvements in dyeing equipment of interest to the piece dyer are a jigg for silk and rayon, equipped with ball bearings throughout, which is designed to give smoothness of running and freedom from tension and vibration; and a new type of jigg developed in Europe which gives a constant cloth speed, has an automatic stop and reverse motion, is fitted with a special device for maintaining the fabric at a uniform width, and has an ebonite dye tank which is proof against acid, shock, and temperature variations.

Mercerizing Cotton-Rayon Mixtures

When cotton-viscose fabrics are mercerized with caustic soda of 50-60 degrees Tw., it is pointed out by Hall that the viscose yarn becomes stiff and brittle, the rayon loses much of its luster, and the tenter clips cut the viscose threads. The deleterious action of the caustic may be avoided by additions to the alkali solution of glycerine, formaldehyde, common salt and various other protection agents. One drawback to the use of these substances is that their introduction increases the difficulty of recovering the spent mercerizing liquor, and in the case of formaldehyde being used the dyeing properties of viscose are considerably influenced. It has been found that the swelling, shrinking, and dissolving effect on viscose is much less with caustic potash than with caustic soda. For this reason caustic potash offers considerable advantages in mercerizing cotton-rayon piece goods and it is being used abroad in this connection under a patented process.

Drying Cotton-Rayon Goods

It has been emphasized that fabrics containing rayon should be dried at low temperatures in order to secure the best results. Three types of extractors of improved design are now offered for removing the excess moisture from rayon piece goods. For crepes and similar constructions the basket type of hydro-extractor with individual drive and interlocking safety cover is suitable, while for other fabrics choice is to be had between a high-speed vacuum extractor and a full-width centrifugal extractor. For fabrics which must be held to width while drying a new tenter dryer with insulated housing, graded temperature control, and improved air circulation is now manufactured.

In drying cotton fabrics with rayon stripes the liability of cockling of the goods is lessened by proper adjustment of tension. A new device has been introduced which automatically controls the tension between machines in range finishing and makes possible the accurate control of machine speed from wet end to dry.

Finishing Trends and Machinery

Important trends in finishing include waterproofing processes, tin weighting, and methods to reduce laddering. On the other hand the necessity for delustering rayon fabrics has greatly decreased with the introduction of the low luster or subdued luster yarns. While in delustering the effect was usually only temporary, and was lost upon subsequent washing, in the case of subdued luster yarns, which is produced by special methods of manufacture, the effect is permanent and in appearance closely resembles real silk.

Waterproofing may be carried out by the usual processes for all-cotton materials, but the use of aluminum salts in conjunction with Ramasit WD, a sizing material containing finely divided paraffin, is favorably recommended. To produce a showerproof fabric with good feel and gloss the goods are treated for 20 to 30 minutes, at 105 degrees F., in a mixture of 15 lb. or Ramasit WD and 10 lb. of aluminum acetate or formate to 100 gallons of water.

To preserve the luster on acetate fabrics it is proposed to treat the goods in solutions containing from 10 to 30% of sulphate or chloride of sodium, ammonium, calcium, barium, or aluminum. It is asserted that goods which have been so treated may be boiled in aqueous solutions for prolonged periods without loss of luster or transparency.

Several methods for restoring luster to badly delustered acetate have been advanced. E. P. 259,266 recommends the treatment of the material with a solution of ammonium sulphate, thiocyanates, alcohol, or alkali sulphites; while E. P. 259,265 mentions acetic acid, phenol, benzyl alcohol, triacetine, etc., as swelling agents to restore luster.

To increase the friction and thus prevent laddering of fabrics containing acetate yarn, the goods may be treated with an 8 to 10% solution of a sulphonated oil such as oleic, stearic, or palmitic acid; or a mixture of turkey red oil with castor oil soap and stearic acid may be employed.

In Europe the tin-weighting of fabrics containing acetate is being carried out on a large scale. It is said that good results are obtained by a continuous process

operated at a high rate of speed and giving up to 25 to 30% weighting. According to the Clavel patents, the acetate is swelled with solvents or softening agents before weighting. Either tin or zinc chloride is used for weighting, while disodium phosphate and sodium silicate are employed as fixing agents. This treatment gives a greater fullness and volume to the fabric without impairing the dyeing qualities, and at the same time lessens the tendency of the acetate to slip or ladder.

Another innovation in finishing consists of uniting fabrics composed of acetate with cotton goods, by softening the former with triacetine or a similar softening agent and then simultaneously passing the two fabrics through a calender.

A new calender designed especially for silk and rayons has been introduced recently which is equipped with ball and Timken bearings throughout. In finishing piece goods containing rayon it is often desirable to produce a silky handle and appearance without too high luster, and in the case of ribbed or figured fabrics to avoid a flattening effect. To obtain this class of finish a number of machines have been developed which make use of either a steam-heated cylinder or a calender roll in conjunction with an endless felt.

Rayon Weaving Suggestions

Practical Advice on Rayon Yarns and Loom Operation

By Ray Winder

THERE is little, if any, profit in using inferior grades of rayon. The writer has had under his direction a set of automatic looms weaving a fancy pattern and laid out for sixteen looms per weaver. When we used an inferior grade of rayon the best we could get was a production efficiency of 65 per cent. Much difficulty was experienced due to filling breakage; the cloth woven was of an inferior grade due to shiners, sluff-offs, and broken patterns. After taking the matter up with the management, permission was granted to use an "A" grade rayon. Without any loomfixing or other alterations, one weaver was able to handle the job and give us first-quality cloth with a weaving efficiency of 85 per cent. A loom has its limitations and cannot improve the quality of a yarn.

Wood temple rolls with steel prongs often cut rayon filling during the process of weaving. A rubber temple roll has been perfected which has helped to overcome this trouble. In some mills there has been a belief that the winding of rayon under the same humidity as it was to be woven under was of great benefit. But experience has taught us that the same results can be obtained without going to such extremes. It is now generally known that rayon should be handled as little as possible before it is woven into the cloth. Every time the yarn is wound from one package to another, a strain is placed upon the several filaments, which are sometimes broken. Strains also produce shiners.

One of the things needed at present is a loom with a shedding mechanism that can be operated while the loom lay is stopped for the purpose of finding the pick. Such a mechanism is already in use on the pick-and-pick looms used in the woolen and worsted industry. At first it would seem that the cost of such a mechanism would be prohibitive, but as rayon has come to stay we should have machinery that is adapted to produce a fabric free from defects.

It has been the writer's experience that a loom equipped with a high roll (not an intermediate roll) take-up motion will give the best results. Another experience of the writer's has been rather a departure from the ordinary practice of using a friction let-off on rayon warps and cotton-warp, rayon-filled goods. We have made excellent fabrics by using the automatic gear let-off on all classes of goods from fine denier voiles to heavy alpacas and eight-harness sateens. In every instance the gear let-off has given the more satisfactory results. This in view of the fact that the friction let-off, which is widely used in the manufacture of real silks, has always been considered the ideal motion for the manufacture of fine goods.

After trying nearly every type of shuttle for the handling of the filling, we have concluded that any type which suits the maker's fancy is satisfactory. By placing a proper tension or friction in a shuttle, any of them can be made to give satisfactory results, provided the speed of the loom is not too great. A speed of over 140 r.p.m. is not recommended for the best results. At present the writer has charge of looms running 170 picks per minute, which produce good cloth. However, when an end breaks it requires more time to bring the loom to a stop than one running at 140 picks per minute, even though its brakes are in first-class condition. The same law applies to speeding looms and shuttles as to speeding automobiles. Lower speeds will give the more satisfactory results in the manufacture of rayon or other fabrics.

In the Narrow Fabric Field

(Continued from page 114)

ately dissolve, and if water is added a milky emulsion or a translucent gelatinous substance will result. Nitro-cellulose, viscose or cuprammonium will not dissolve.

(B) Select a few strands of the rayon to be tested and hold them over the eye-cup. Moisten them with a few drops of solution No. 2. Nitro-cellulose rayon will immediately assume a deep blue color and will dissolve to form a blue fluid. The other rayons will not be colored blue and will dissolve more slowly.

(C) Place a few drops of solution No. 3 in the eye-cup. Immerse for about ten seconds a few strands of the rayon to be tested and then rinse them in cold water. Viscose rayon will be stained a light pinkish shade, while cuprammonium rayon will be dyed a deep red color.

The Burning Test

Cellulose-acetate is the only one of the four common types of artificial silk that may be definitely distinguished by the burning test. If the flame from a lighted match is brought close to a few threads of cellulose-acetate the yarn will melt or fuse, and on burning will sputter. The ash forms into a very hard, charred mass.

Nitro-cellulose, cuprammonium and viscose rayons may not be distinguished from each other by the burning test. However, nitro-cellulose, in the natural state at least, is very quick burning and the flame is inclined to be bluish and rather sputtering. No ash is formed. Cuprammonium and viscose rayons, although igniting readily enough, are about as slow burning as cotton and leave no ash.

(The samples reproduced in connection with this article are shown through the kindness of the Hope Webbing Co., Inc., Providence, R. I.)

PRINTING Viscose Rayon Fabrics

Procedures in printing rayon fabrics vary greatly with the class of work and type of pattern. This article gives many useful ideas on preparing, printing, colors employed, ageing, soaping, and drying.

By A. E. Hirst

THE printing of viscose fabrics does not differ essentially from the printing of plain cotton goods, the principal difficulties to be avoided being merely a matter of detail. This article will deal largely with these details. Most of the attention required in handling viscose fabrics is the same basically as that necessary in their dyeing for plain shades, with the preliminary and finishing processes, but of course there are variations depending on the type of weave.

Preparing the Cloth

For certain of the more durable fabrics such as rayon alpacas, it is permissible to give the goods a mild boil in the kier, especially in the case of cotton-rayon mixtures. Preliminary malting and washing is carried out in the usual way. Of course great care must be used in drawing into and out of the kier and through the other machines to prevent fraying and splitting. Heavy nips, such as are present in log washers, are to be avoided since small cracks which are difficult to detect may occur. By jacking up the upper bowl slightly, so as to give very light pressure, enough tension may be exerted to furnish a pull on the cloth without damage.

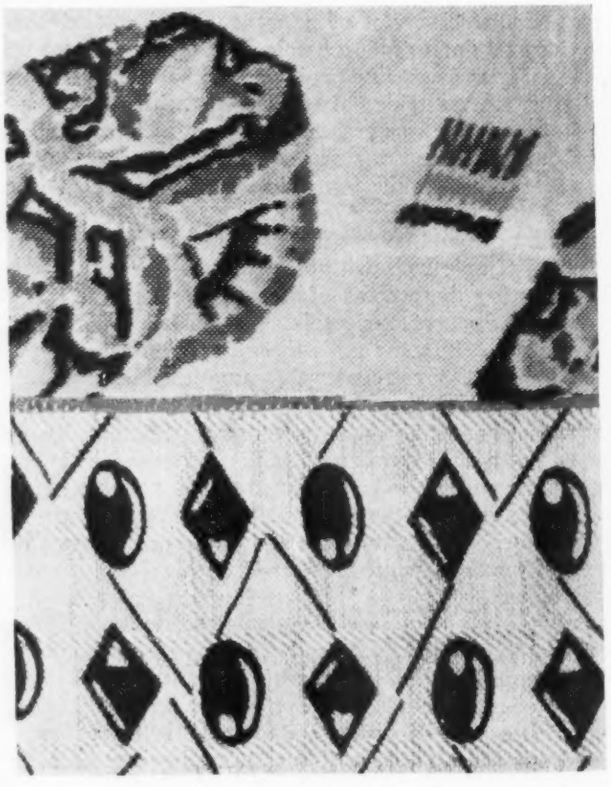
When permissible, and this applies to most fabrics to be printed, it is policy to give the goods a thorough malting, followed by a wash and gentle scouring in a reel machine with weak caustic soda solution and soap. After rinsing and extracting, opening and drying, the cloth is ready for dyeing or printing. In many cases treatment with chlorine is unnecessary where the gray goods are fairly white, and large areas of white ground do not show in the print. When subjected to kier-boiling, the boiled-out goods may be rinsed and chemicked while lying in the kier.

Further details as to bleaching are unnecessary, as they are identical with those which hold for plain dyed fabrics. The material is now ready for dyeing in the usual way, for preparing with the ordinary naphthols, or for printing as unprepared white grounds.

With the present tendency toward bright red, orange, and gold, many of the rayon goods must be prepared, the better fabrics with the newer types of naphthols. This type of preparing may be done by slop-padding with a mangle composed of rubber and brass bowls, with a minimum amount of threading up. The operation may be carried out by batching and subsequent drying, or by padding and direct drying on a tenter frame. Where blistering on a dry-can set is encountered, the goods are padded, passed some distance above the cans, and when thus partially dried, are threaded on the cans in the usual way.

Handling All-Rayon Voiles

Depending on the type of pattern to be printed, the cloth may now be wound and sent direct to the printing machine or, when check patterns are involved, they receive a preliminary straightening on a 90-ft. or short frame. It is simply necessary here for the operator to avoid fraying. Since there must be some tension on the frame for the carrying out of this process, some fabrics



Top, All-Rayon Taffeta Printed with Vat Colors; Bottom, Cotton and Rayon Alpaca Prepared with Naphthol ASD and Printed with Fast Scarlet and Vat Blue

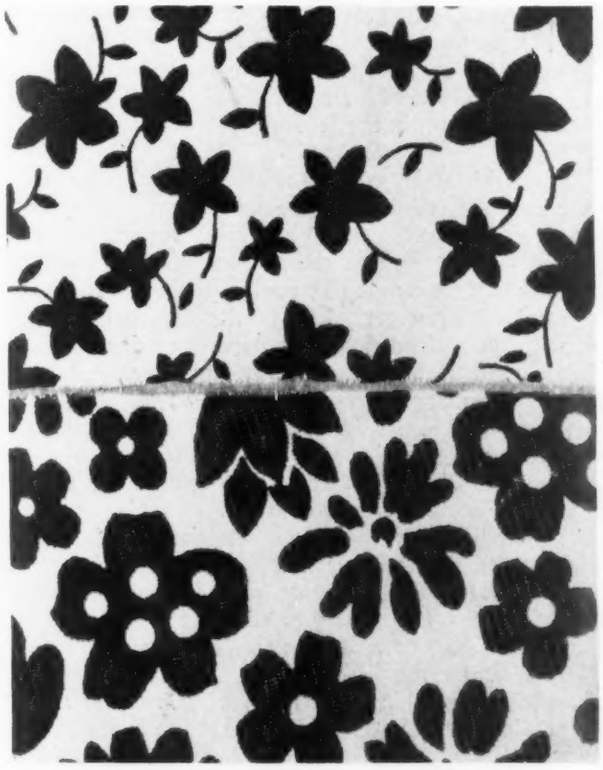
will be successfully framed only if the original scouring has been properly done. Too drastic treatment, especially in the rope form, will shrink certain portions to such an extent that they will split in the framing. This applies particularly to all-rayon voiles, where changes in the filling bring about variations in the ability of the piece to withstand stretching. For these fabrics, scouring in the open state is advisable.

Crepes are ordinarily merely scoured after creping, and must have been carefully tentered free from scrimps when ready to go to the printing machines, otherwise exceptional care must be used in running over spreader rolls to avoid misprints.

Colors Used on Viscose

The printing colors used in viscose, and viscose and cotton mixtures, are generally identical with those for plain cotton. Basic dyestuffs, vats, and the fast naphthol colors are commonly employed and are after treated in the same general ways as used for cotton. The use of aniline black is attended with some danger, and it is questionable whether this color should be printed. While some success has been met with, at times a dangerous tendering condition has been encountered, and it has proved advisable to use the more expensive but more reliable vat or fast naphthol blacks.

Scrimp-bars on the printing machines should be avoided, and rollers substituted to avoid fraying and the displacement of the rayon figures. Particularly in the case of crepes, care should be taken to use as little tension as possible on the goods as they are drawn from the nip to the dryer. This holds mostly where heavy blotches are used, as under heavy tension there is a tendency for the crepe to flatten in its moist state. Air dryers or cans may be used as desired.



Top, Rayon-Filled Crepe Printed with Leucosol Black; Bottom, Rayon-Filled Tricotine Printed with Fast Scarlet on Naphthol ASD Prepare

In the case of hydrosulphite discharges and vat colors, the goods now pass to the agers. Here again the utmost care must be used to see that there is no undue tension in the box or on the draw rollers outside. A very good type of machine is now available with roller bearings on all the rollers, many of the latter being driven. The goods may be easily drawn out without their being crushed in a nip. Ageing conditions, such as temperature and moisture, are as usual.

Varying degrees of soaping are used, depending of course on the type of colors used, and the usual precautions are observed with respect to draw rollers and scrimp-bars. It is advisable to use some type of compensator between open-soapers and dry cans. Where the reel washer is not available for rope soaping, the regular log washer may be used, but the upper log must be raised enough to eliminate the crushing effect of its heavy weight as described under bleaching. It is, of course, best to provide a reel machine in which such danger of damage is eliminated. The goods are then extracted and may be dried by air or over cans.

We need not dwell here on the subject of finishing rayon fabrics, which has been discussed in detail in other articles devoted to this branch of textile finishing. Finishing of prints is similar in principle and detail to the finishing of other fabrics made out of rayon.

Identification of Rayons

How to Tell One Type from Another; Also from Animal and Vegetable Fibers

*By Arthur K. Johnson, S. B.**

THE importance of suitable rapid means for identifying a type of rayon under commercial conditions is still very great. It is frequently desirable or necessary not only to learn to which of the four major groups (viscose, cuprammonium, nitro, or acetate) a given sample belongs, but also to subdivide each group more finely, in the effort to learn the probable manufacture of the rayon sample.

Animal, Vegetable, and Rayon Fiber Mixtures

The increased production and improvement of rayons which closely resemble commercial silk in appearance and feel, make it imperative to carry out preliminary tests on unknown samples to determine the presence and location of animal fiber. Added to this condition are (1) the growing tendency to utilize in spun yarns artificial wools and other treated vegetable fibers, alone or mixed with animal fibers, as of wool or silk; (2) the possibility of the limited appearance of rayons made from waste silk.

A simple test for animal fiber is the burning test. In this, a closely twisted wad of the fiber is approached to a flame until the fibers are scorched and ignited. The flame on the burning yarn is extinguished and the odor of the white fumes then given off is noted. With animal fibers, this odor resembles that of burning hair. The tendency to melt and to form a hard globule of ash is also characteristic of animal fiber and acetate rayons. One cannot always assume when this odor of burning hair is noticed, that all of the fibers present are animal

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fibers. Hence, the use of Millon's reagent is desirable.

This reagent is easily prepared by dissolving a given weight of mercury in an equal weight of concentrated nitric acid (cold) and then diluting the resulting solution with an equal volume of cold water. This reagent gives a red color when warmed slightly with animal fibers, on a glass. It gives results which are easy to interpret with most dyed samples as well as with white ones. Rayons are not colored by this reagent. To make the test cover the sample on a piece of glass with a few drops of the reagent; warm to blood heat. The red color characteristic of animal fiber will develop in a few seconds. It is said that fibers which are still wet with alcohol are liable not to respond to this reagent.

If it is desired to concentrate the rayon fibers present in a mixture with animal fibers, for further examination, it is best to first give the sample a good extraction with acetone (cold, or warmed with hot water—no free flames) or with boiling strong acetic acid. This treatment will dissolve out any ordinary acetate rayons which may be present. These may be shown in the used reagent by diluting it with a good quantity of water. The acetate rayon will be precipitated under these conditions. The animal fibers may now be dissolved in boiling 10% caustic soda, after which the rayon and vegetable fibers will be left and can be washed free of chemicals with water.

Tests for Acetate Yarns

The typical test for acetate fibers continues to be that which relies on their quality of dissolving in solvents like warm acetone or strong acetic acid. Certain acetate silks may show a natural low solubility in acetone. Also, partially saponified acetate fibers, due to previous treatment with alkalies or with acid salts, as in tin weighting, have their chemical composition altered in proportion to the extent of the treatment. This alteration has a proportionate effect in reducing their solubility and in changing their staining or dyeing powers.

The burning test for unsaponified acetate yarns is valuable. Observation of the results includes the melting with heat, the presence of a globule of ash, and the burning cotton odor of the white fumes after the extinction of the flame. Saponified acetates, owing to their change in composition, do not melt as readily, if at all.

Nitro or Nitrated Rayons

Nitro rayons have a practically specific test in the blue color developed when the water-moistened sample is put into a cold, 1% by weight, solution of diphenylamine in 95% nitrate-free sulphuric acid. "Chardonize" responds to this test similarly to regular Tubize rayon. Nitrated cotton, nitrated viscose or other rayons, or nitrate impurities give the same reaction. If Millon's reagent gets on to the fingers and then the rayons to be tested are contaminated with this reagent by handling, these contaminated rayons will give a temporary blue color which may lead to erroneous conclusions.

Viscose and Cuprammonium Rayons

In every case requiring the distinguishing of an unknown rayon sample as to whether it is of the viscose or cuprammonium variety, it is deemed wise to prove first that animal fibers, acetate and nitro rayons, are absent. This does away with troubles due to the similarity in staining reactions of these types with either viscose or cuprammonium samples, and therefore simplifies the interpretation of the results of staining reactions.

Two chemical coloration tests to distinguish between viscose and cuprammonium rayons, which are recommended and carefully described in *Artificial Silk*, by Reinthaler-Rowe, are as follows:

(1) Staining Method

Dye five minutes at room temperature in a solution containing

Pelican Ink No. 4001 (Gunther Wagner)	15 parts
Eosine Extra (0.5% solution) (I. G. Farbenindustrie)	20 parts
Water	65 parts

After dyeing, rinse samples thoroughly and dry. Viscose is colored light bluish red; cuprammonium turns deep blue.

(2) Staining Method

For the Pelican Ink of Formula 1, there can be substituted one containing in one liter of water

Ether Tannin S (Geigy)	25 grams
Gallic acid W. C. cryst. (Geigy)	7 grams
Ink Blue H (Geigy)	5 grams
Ferrous sulphate c.p.	30 grams
Hydrochloric acid c.p. conc.	7 grams
Salicylic acid pure	1 gram

For the staining solution use 15 cc. of the above, adding 20 cc. of 0.5% aqueous solution of Eosine Extra, and 30 cc. of water.

To stain, treat the rayon, cold, for a few minutes, rinse thoroughly in water, and dry at a temperature not over 60 degrees C. Viscose is light-bluish red in color, while cuprammonium is blue.

Testing with Wright's Stain

A third test, which the author has found in his own experience to be highly satisfactory for use in the proved absence of silk, cellulose acetates, and nitro rayons, employs "Wright's Stain." This stain is a precipitated eosine-methylene blue, used in a saturated alcoholic (denatured) solution. It may be purchased cheaply from any chemical or biological supply house in either dry form or as a saturated solution in alcohol. It may also be easily made up in the laboratory from methylene blue and eosine.

To use this stain, put *dry* rayon into a *dry* container; cover the fibers with the reagent, and heat just to a boil, in a few seconds. Pour the surplus reagent off from the fibers and back into the reagent bottle. Wash the stained fibers thoroughly in running cold water, or in a large volume of water. The results of the test can be told with the stained sample in the wet or dry condition. Viscose rayons are stained a blue color, while cuprammonium rayons are stained as violet shade. In making the test be sure to use dry samples and utensils, as water present during staining causes both rayons to dye a violet shade. Likewise, be sure to prove the absence of silk and acetate or nitro rayons.

Microscopic study of the cross-sections of the rayons coupled with the staining reactions, is of assistance in telling cuprammonium from viscose types and also in helping to distinguish the product of a given manufacturer. Such comparisons are best made against standard samples.

In the microscopic observation of delustered and of dull or diminished luster rayons, good use is reported of the various kinds of dark ground, polarized, 90 degree oblique, or ultra-violet illumination. Such methods are more suited to special laboratory uses than to the usual or casual tester's needs.

LABORATORY CONTROL

Improves Rayon Products

*By D. S. Chamberlain**

IN THE throwing of rayon yarns, laboratory control of all the various treatments is most important in turning out a superior product. The throwing of combination yarns requires still greater laboratory inspection, as the treatment of cotton, wool, silk, and the many varieties of rayon each demand special consideration.

The first operations that are required of the laboratory are the inspection of the quality of materials as received, including soaps, oils, water, lubricants, etc., and physical tests on the various textile fibers for evenness, defects, elasticity, tensile strength, running qualities and many other characteristics. Such tests require a complete laboratory equipment for the chemical and physical study of soaps, oils, and water, and such apparatus as reelers, winders, seriplanes, serigraphs, evenness room, dry ovens, soaking baths, centrifugal machine and all the equipment necessary to run a test lot of any material.

Rayon and the fibers with which it is combined, first require a lubricating and softening treatment to prepare the filaments for the further throwing and knitting operations. Each fiber must be specially treated to provide the proper running qualities on the full fashioned hosiery machine, seamless machine, or to be suitable for the tubular knit single ends for cloth. This lubricating treatment is applied by either spraying, dipping, water soaking or wicking the oil into the rayon. The type of treatment and the oil take-up depend on the purpose to which the yarn is later to be put. For hosiery tram the oil take-up varies from 6 to 8%; on the other hand, the take-up for circular knit cloth might run as high as 15%. Apparatus for determining oil take-up is a part of the necessary equipment in a silk laboratory. In order to keep pace with the many rayon oils that are constantly being introduced, apparatus is necessary to run oil treatments on several pounds of yarn at one time. Viscosity, surface tension, flash and fire points are important factors to be determined in the oils.

It is often necessary prior to the throwing operation to identify yarn lots by the use of fugitive tints. Oil soluble tints have lately been developed, but they require constant laboratory attention to determine whether they will boil-out completely in the scouring bath.

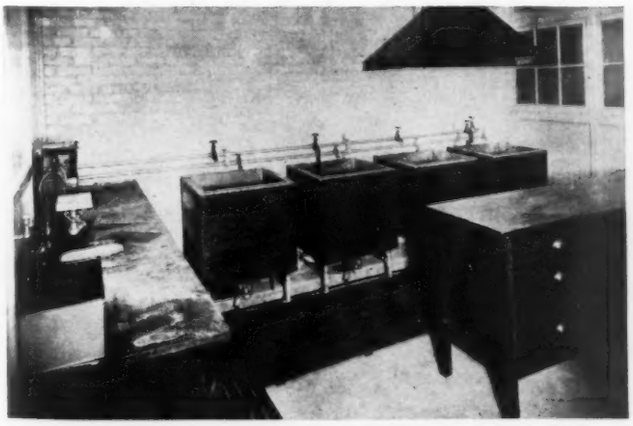
The winding, spinning, and coning operations should be checked for running qualities as regards knots, loose filaments, stripping and all such physical troubles. The microscope combined with the photomicrograph brings out the various troubles encountered in the throwing operation. Thread turns and number of ends are easily identified on the twist tester. As the strength of rayon is much lower than that of silk, some difficulty is experienced with loose filaments, knots, slugs, strippings, etc.

If one establishes the position that the knitting and weaving mills' problems are the yarn producer's problems, the weight of laboratory investigations on rayon products increases greatly. Defects in hosiery such as dropped stitches, stripping, bands, harshness, and sleaziness are analyzed to show whether the defects were caused in the initial treatment of the yarn or whether the defect is caused by improper knitting.

The seriousness of overworking or overbleaching rayon yarns and fabrics has resulted in the adaptation of tests that have been used in studies of the overbleaching of cotton. Tests which determine the "copper number" or the "permanganate number" appear to indicate to what extent a normal wear can be obtained from a fabricated garment.

The matching of colors is a problem that still requires considerable research. The use of color measuring instruments, like the Hess-Ives tintometer, is an important piece of laboratory work, but on some occasions the results obtained in a color analysis cannot be used to direct the dyer in the development of a particular shade.

*Manager, Technical Development Department, The R. K. Laros Silk Co., Bethlehem, Pa.



Boil-off and Experimental Soaking Room; Wet Laboratory

Evenness Room, Seriplanes and General Laboratory

SALVAGING Oil-Stained Rayon Goods

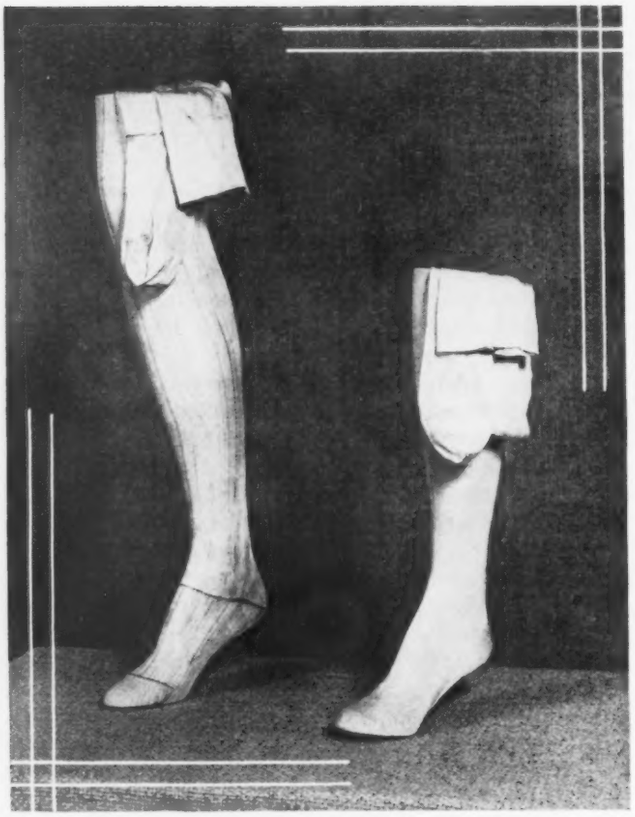


Fig. 1. Oil-Stained Stocking Knit on New Machine and Stocking with Oil and Metal Removed

This article discusses unavoidable oil stains in hosiery and woven fabrics which are a frequent cause of seconds. The writer points out an inexpensive and effective method of salvaging goods containing these stains.

By Herbert C. Roberts

ON MOST "run of mill" goods, whether skeins, knit goods, or woven fabrics, the dyers' and finishers' problems are chiefly connected with matching shades and producing the desired finish. There are, however, varying percentages of each mill's output which are not up to standard, and these present other problems for the dyer and finisher. These imperfect goods are designated as seconds, imperfects, irregulars, substandards, etc. The proportion between firsts and seconds largely determines the profits of the manufacturer, and dyers and finishers may tip the balance one way or the other. They can salvage certain types of seconds which are produced in large quantities, but of course it is not reasonable to expect them to do anything with seconds made by faulty design, construction, ends out, mispicks, drop stitches, etc.

Many seconds are caused by incomplete removal of unavoidable oil stains and these can be salvaged. By "unavoidable oil stains" is meant stains which cannot be avoided by changes in machine design or a change in lubrication. For example, when a new circular knitting machine is installed and "run in," the working parts are more or less rough. The needles, sinkers, guides, and cams have not acquired a polished bearing surface. Minute metallic particles are loosely attached to the parts by rust preventatives used by the machine builder and by lubricating oils used by the knitter. No matter how stainless the so-called stainless lubricating oils may be, these metallic particles suspended in the oil get on the yarn, are knit in the goods, and do not come out in ordinary processing. At the left of Fig. 1 is shown a rayon stocking that was knit on a new machine. Note the black oil stains running vertically up the leg, also the more pronounced streaks where the needles have changed at the heel and toe.

The scouring formula used for regular production, that is to say, after the machine is broken in, is totally inadequate to remove these stains or marks. Consequently, these goods must be dyed black and other extremely dark shades, for which there is little demand, or colored regular shades and sold as seconds. As there is considerable difference in the selling prices of firsts and seconds, the manufacturer can well afford to spend a little more money for processing these goods and reclaim them as firsts.

Removing the Oil Marks and Metal

These stains being of an oily nature, one would naturally think that a solvent such as gasoline, naphtha, or carbon tetrachloride would remove them. These solvents are effective in removing the oily portion only, but do not take out the metallic particles, which give the stain its dark color. In addition to a solvent to remove the oil, something must be used that will either dissolve the metal or place it in a state of suspension where it will not adhere to the fibers. About the only material capable of dissolving the metal is an acid, and treatment with this would be too severe on the fabric; therefore, the only way left is to put the metallic particles in a state of suspension. Preparations made by using sulphonated oils in combination with solvents, such as pine oil, cresylic acid, and carbon tetrachloride, have the property of cutting or thinning down the oil and also hold the metallic

particles in suspension so that they are readily removed.

There are many chemicals that combine with sulphonated oils, which are efficient in removing the stain and keeping the bits of metal in suspension, but are unsuitable for use on rayon material because they also have a solvent action on the rayon. The various brands of acetate cellulose are more susceptible to this solvent action than the regenerated brands of rayon. Alcohol, amyl acetate, chlorbenzol, and several others must not be used.

After the goods have been treated with the sulphonated oil and solvent, they are put through the regular processing. A very efficient and economical method of removing these oil stains consists of impregnating the affected portion of the stocking in a cold standing bath of the straight or neat solvent for a period of one-half hour or more. A wooden wash tub with a household wringer makes an excellent and economical piece of equipment. After saturating and softening the stains, the goods are run through the wringer, which removes the excess solvent and returns it to the bath. At the same time the pressure of the wringer helps to soften the spot and place the particles in suspension. After the treatment, the goods are scoured in the usual manner, either separately or with other batches of goods containing no oil stains.

In scouring goods containing oil stains, it is desirable to permit the first rinse water to overflow the top of the machine. In this way the oil and dirt are carried off and there is no danger of their settling in the goods. The stockings at the right of Fig. 1 represent goods that were originally stained as badly as the stocking at the left, after they received this preliminary treatment and were scoured in the usual manner.

The consumption of solvent and sulphonated oil mixture amounts to about a pound for two dozen pairs. This makes the cost, including time and labor, about 25c. to 35c. per two dozen pairs. In other words, for an expenditure equal to the difference in price between one pair of firsts and one pair of seconds, two dozen pairs can be salvaged and reclaimed as firsts.

Stains in Woven Goods

Most oil stains in woven materials are the result of soiled filling. The filling can be soiled in a number of ways, such as being caught in the bearing of a winder, by a weaver or a loomfixer grabbing a bobbin with dirty or oily hands, by a dripping bearing, etc. A weaver's problem can be even more serious than a knitter's. There are many weavers who send their goods to commission dyers and finishers, and several cases have been known where the dyer has refused to process goods which were badly oil stained, for fear that the stains would mark off and ruin other goods in process. The illustrations at Figs. 2 and 3 show pieces of fabric that a dyer refused to process because of oil stains.

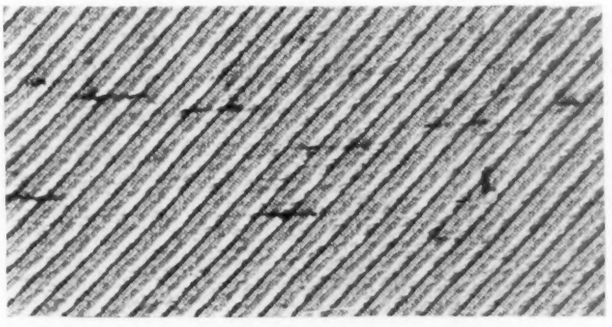


Fig. 3. Stains Similar to Those in Fig. 2

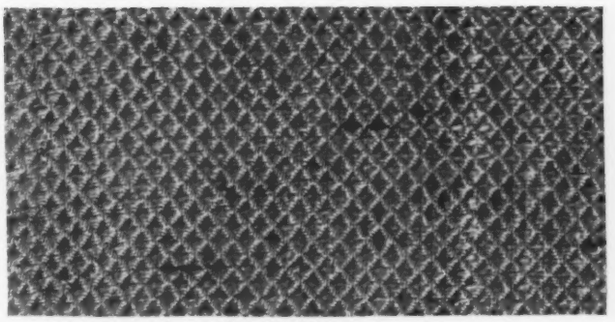


Fig. 2. These Stains Might Damage Other Goods in Process

Manufacturers have attempted to remove these stains in the cloth room where the goods are inspected. The inspector usually takes a can of volatile solvent and spots the stain, with the result that the color of the spot is materially reduced. As a matter of fact, the inspector has merely spread the spot over a larger area and, in most cases, after the goods have been dyed, the spot shows up either as an off-shade portion or as a place with a different luster or appearance.

Unavoidable oil stains of this character are more easily disposed of than stains in knitted fabrics, and with less expense. In place of the ordinary volatile solvent, the preparation mentioned above is used. The method is exactly the same as spotting with ether or naphtha. The sulphonated oil solvent acts as a carrier for the metallic particles and holds them in suspension. They are then washed out of the goods in the usual scouring operation. Apparently no damage is caused to the goods by allowing the oil and solvent to remain in them over periods of time. Goods have been spotted with a sulphonated oil solvent and have been processed some three months later. It was impossible to notice any unevenness in dyeing or any difference in luster.

Rayon in Men's Underwear

(*Continued from page 125*)

but the rayon and natural fiber mixtures are perhaps even more in demand. During the last year, rayon has been used increasingly in combinations with silk, cotton and wool. These mixtures are especially favored by knitters who aim at distinctive colorful combinations.

Inasmuch as style is on the ascendancy in all fabric and apparel fields, it would seem that the dyeing possibilities of rayon, in combination with other fibers, represent one of its big assets. Certainly, this is true in the knit goods field, where style is a paramount consideration in production and merchandising. Both knitters and retailers agree that the consuming public is becoming more and more style-conscious; more and more insistent upon apparel which presents an attractive appearance. During 1929, the preference of the consumer for rayon knit goods which stressed the style element, has been pronounced. Rayon's job of winning acceptance in the knit goods industry has not been an easy one. There were many prejudices to overcome—and some of them are still a problem. When the manufacturers started to utilize rayon for its pleasing color effects, however, they took a big step forward. They used style to beat down sales resistance; and the progress made to date is sufficient testimony to the effectiveness of that weapon.

Microscopical Examination of FILAMENT CROSS-SECTIONS Yields Valuable Information

*By Edward R. Schwarz**

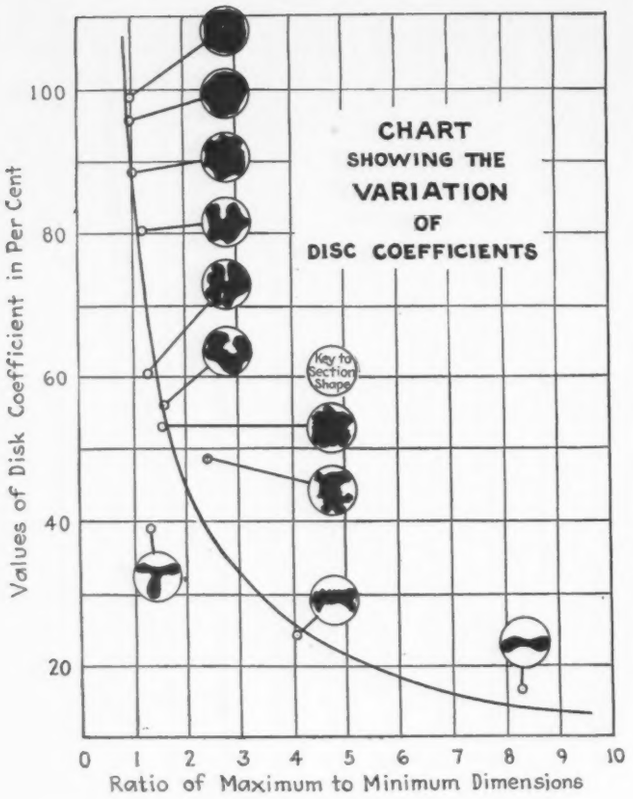


Fig. 1. Showing Variation of Disk Coefficient with Ratio of Maximum to Minimum Dimensions

STUDY of the cross-sections of the usual textile fibers has resulted largely from a desire to ascertain something regarding their structure. The attempts to adopt the procedure developed by the biologist, or by the botanist, for the sectioning of fresh tissue, were not satisfactory for rapid work. Hence the attack on fiber problems via the cross-section route was, for a long time, lacking, or only sporadic. With the advent of more suitable methods of sectioning textiles[1] the difficulties of this sort of investigation are no longer insuperable. This is fortunate for the worker with rayon, since here the examination of the filament cross-section is productive of a considerable amount of valuable information.

Matter of Few Minutes

Rayon is a man-made fiber, and is, therefore, subject to control in all the steps of its manufacture. Slight changes in certain of these stages result in distinct modifications of the filament, and frequently of its cross-section. The preparation of rayon sections is now a matter of a few minutes and need not involve any chemical treatment or heating, which might conceivably affect the shape of the sections[2]. The simplicity of the task of sectioning puts the whole method of inspection and study directly within the grasp of the man actively engaged in the industry—whether interested in manufacturing, converting, or selling.

It may be well to start the detailed consideration of the subject by reviewing the possibilities manifested by the shape of the section. In general, the shape is more or less characteristic of the type of rayon involved. This is no longer an unqualified statement. It is possible to produce viscose rayon, for example, in a multitude of shapes. Broadly, it is true, however, that these tend markedly to be rough surfaced—or, as seen in section, to be serrated.

A greater difficulty of distinction lies between the acetate of the Celanese type and a nitrate of the Tubize type. The similarity of the shapes of the sections makes it almost impossible to state which is which from a consideration of shape alone. Later a further distinction not based on shape will be mentioned. Cuprammonium rayon is quite characteristic with its round section and small filament size. As has been pointed out by Johnson[1], the best scheme is to file sections of known specimens for reference, and then to compare the unknown sample with these. Shape of section then may be considered as an aid to general investigation, but not necessarily as a positive means of identification.

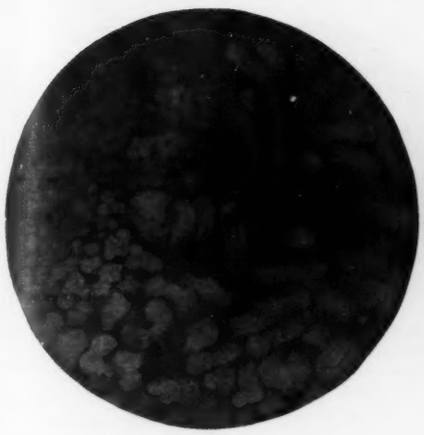
Relation of Shape to Luster

The luster of rayon is at the same time one of its greatest assets and liabilities. A high sheen is desirable,

*Of the Textile Laboratory, Massachusetts Institute of Technology.

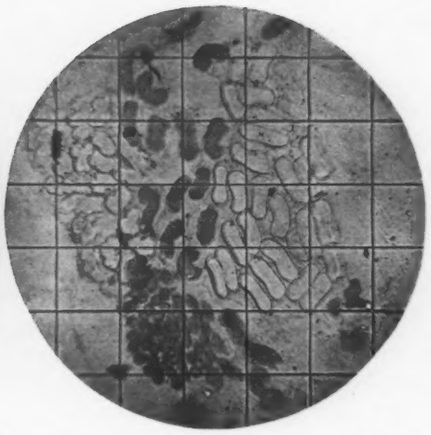
[1]Johnson—TEXTILE WORLD *Rayon Year Book*, 1928, p. 97.
Heink—*Melliand Textilberichte*, 1928, p. 38.
Herzog—*Die Mikroscopische Untersuchung der Seide und der Kuntseide*, pp. 19; *Kuntseide*, 1927, pp. 558-561; *Silk*, 1928, pp. 13-17.
Schwarz—TEXTILE WORLD, Feb. 9, 1929. See also forthcoming article in TEXTILE WORLD series on the microscope in the textile industry.
Willows & Alexander—*Journal of the Textile Institute*, 1921, pp. 99-100.

[2]Viviani—*Kuntseide*, 1929, Vol. 11, pp. 111-112.
Herzog—*Mikro. Untersuchung d. Seide u. d. Kuntseide*, p. 20.
Schwarz—See first footnote.



Sections of Viscose, Nitrate, Acetate, and Cuprammonium Rayon. This section is made by the brass-disk method of Johnson, as improved by Schwarz, and the picture is taken by transmitted light, with a higher power objective than was possible by the older scheme, necessitating illumination by incident light only.

Typical Cross-Sections of the Flattened and Serrated Viscose Rayon. Consider the shape of these sections from the standpoint of luster and covering power.



Identification of Rayon by Cross-Section May Be Made Easier Where Possible by the Use of Staining. Here the acetates (Lustron and Celanese) have been unaffected by the dye, which has colored the viscose, cuprammonium, and nitrate types. Note the use of the square rulings to make counting of the filaments easier.

but the metallic luster often encountered is not always agreeable. The causes of luster must, therefore, be considered carefully by both the manufacturer and the user. In this connection the shape of the section is one of the most important factors. In the case of viscose, for instance, it has been conclusively shown that the circular-sectioned filaments refract a large percentage of the light reaching them, and thus appear transparent. The light reflected from the surface obeys very closely the laws of reflection from a cylindrical solid and is regularly dispersed.

It is also true that the circular area is the one which presents the minimum of surface for the action of the light. On the contrary, the flattened and serrated type of cross-section allows comparatively little of the light to pass in the regular manner above mentioned, while the serrations on and the flattening of the filament furnish a substantially increased amount of surface. It is well known that a sheet of glass is transparent and reflects and refracts light regularly, thus presenting a polished surface. If, however, the amount of surface presented to the action of the light be increased greatly by sand-blasting, or etching, we have the dull, opaque, matte-white surface of the "frosted" glass.

Thousands of Serrations to Inch

Actual microscopic count shows that in a serrated viscose fiber, the ridges are spaced so closely that there are literally thousands of them per inch. Thus the same effect is produced in the rayon as in the glass[3]. The presence of fine air or gas bubbles or particles of sulphur in the filament, will also tend to produce an opaque appearance, and the presence of these minute particles or voids can be detected best in the cross-section of the filament. The development of fine, high filament-count rayons is partly founded upon the theory of increase of surface and diminution of luster.

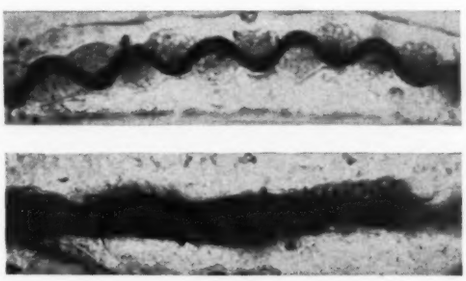


Fig. 2. Cross-Sections of Rayon Satins (Viscose Rayon). Note the shape of the yarn sections—upper, rounded; lower, flattened. Note also the crimp in the longitudinal yarns, the set of each fabric, and the covering power of the rayon yarns. The fabrics are the same thickness.

Covering Power

Covering power will also be directly affected by the shape of the cross-section. The round-sectioned types occupy the minimum of space, and consequently pack into a circular yarn quite naturally. The flat-sectioned types, on the other hand, tend to produce flattened yarns —and since, as has already been pointed out, these flat sections are much more opaque, the covering power will be greater. The regular, indented sections tend to pack together and to interlock much like the pieces of a picture puzzle, and thus to retain a flattened yarn section even after the release of pressure, as in calendering.

The round sections tend to roll on one another, and eventually to restore the circular section to the yarn. Thus after wear, a fabric made up of this sort of material will appear thread-bare due to the wider spacing of the yarns. The difference is only apparent, and not an actual change in the number of yarns per inch in the cloth, but because it is apparent it must be guarded against. Again the multi-filament yarns of small denier per filament and of high filament-count tend to hold the desired shape better, because of closeness of packing and smallness of unit[4].

Wear Resistance

The wear resistance of the filament has a great deal to do with the wearing qualities of the yarn or fabric in which it is used. Filaments which present a "sharp-cornered" effect will soon be decreased in cross-sectional area by the wearing away of these projections. This is of vital consequence in rayons, since the strength of the yarn and hence of the fabric is directly dependent

[3]Schwarz—"The Microscope as an Aid to Carrying on Rayon Research," TEXTILE WORLD, Sept. 24, 1927, p. 94. (See Fig. 1.)

[4]Manning—"Effect of Filaments on Plating," TEXTILE WORLD *Rayon Year Book*, 1928, p. 155.

upon the tensile properties of the filament. The filament-strength is proportional to the cross-sectional area, other factors being equal. Reduction in area due to wear will result in weakening of the filament. The majority of the rayons are well adapted to resist localized abrasion of this sort, but the fact remains that intelligent consideration must be given to the shape of the section by the manufacturer who wishes to maintain or to increase the wear resistance of his product.

Causes of Differences in Shape

Much research is still to be undertaken to determine just what causes the differences in shape of cross-section shown by various rayons and by different batches of the same kind of rayon. Where a coagulating bath is used, there is now little doubt that the amount and kind of salt used is a deciding factor. The speed of traverse of the bath, the orientation of the spinneret, duration of immersion, tension in spinning, temperature, concentration of bath, viscosity of solution, etc.,—all have an effect[5]. The shape of the spinneret orifice (now almost universally circular) has a decided effect[6], and study of the changes of shape of the cross-section because of changes in the manufacturing process of one sort or another is of immediate importance. This is true, not only as a piece of science research which involves the questions of osmosis, evaporation, coagulation, shrinkage, pre-stressing, etc., but as a check-up on any changes which may have unknowingly occurred during production of the yarn.

It is being more and more widely realized as a result of the study of rayon filaments under polarized light by means of the microscope and in the further investigation by means of the X-ray apparatus,[7] that these filaments exist in a stressed condition, and that many of the physical properties depend upon the degree of pre-stressing. The author is becoming convinced that the lobed-shaped sections such as the nitrates have are much more likely to be the result of physical phenomena directly connected with stress conditions as applied to the ultimate structure than to purely chemical causes. The physical chemist has here an immense and largely untouched field for the development of fundamental hypotheses and possibly one productive of results of distinct general importance in the fields of both physics and chemistry.

Determining Specific Gravity

Returning to the determinations of immediate practical importance, we may consider the question of specific gravity. It is well known that rayon has a higher specific gravity—i.e., weighs more per unit volume—than silk. This property is of importance to the person interested in either the handle and draping qualities of the material, or the weight of a garment as a whole. Various methods for the determination of the specific gravity of rayons have been adopted.

Most of the methods noted depend upon the accurate weighing of a liquid displaced by the filaments. Many immersion fluids have been used, but the apparatus involved is more or less delicate and special, and the technique demanded is usually somewhat exacting and complex. It is much more of a laboratory procedure than a practical factory method. A microscopic

[5]Faust—"Artificial Silk," pp. 24-28.

[6]Foltzer—"Artificial Silk and Its Manufacture," pp. 215-217.

[7]Clark—"Application of X-rays in the Textile Industry," Chem. Eng. Dept., M.I.T., Bull. No. 183.

Nitrate Rayon Sections under Polarized Light. Note the dark patches which are colored in the original specimen, although the rayon itself is colorless

method is available which is simple and reliable, and which calls for no more equipment than should normally be employed in any rayon plant. No more skill is required than is necessary for any test of fair delicacy and precision.

The scheme in its essentials is simply to determine the denier of the yarn under test as accurately as possible. The method is too well known to go into here. After this has been done, the number of filaments composing the yarn must be determined. The author has outlined several methods for easily accomplishing this (again involving cross-sectional investigation), and the reader is referred to an article appearing in the *American Silk Journal* for May, 1929, p. 48, for further details on this subject.

Cross-Sectional Area

It now only remains to determine the average cross-sectional area of the filament. Cross-sections may be prepared by any desired method and the outlines recorded by means of a camera lucida, by projections, or by photography. Measurement may be made with a planimeter, or by weighing the cut-out shapes in paper. The specific gravity is expressed in grams per cubic centimeter. Since we know the denier of the yarn (one denier equals .05 gram), we know the weight in grams of 450 meters of yarn, or $n \times 450$ meters of filament.

Thus we have,

$$\frac{.05\ D}{45{,}000\ n} = \frac{D}{900{,}000\ n} \text{ gm. per cm.}$$

Now if the cross-sectional area of a filament averages a square centimeters, the formula for specific gravity becomes

$$G = \frac{D}{900{,}000\ n\ a} \text{ gm. per cc.}$$

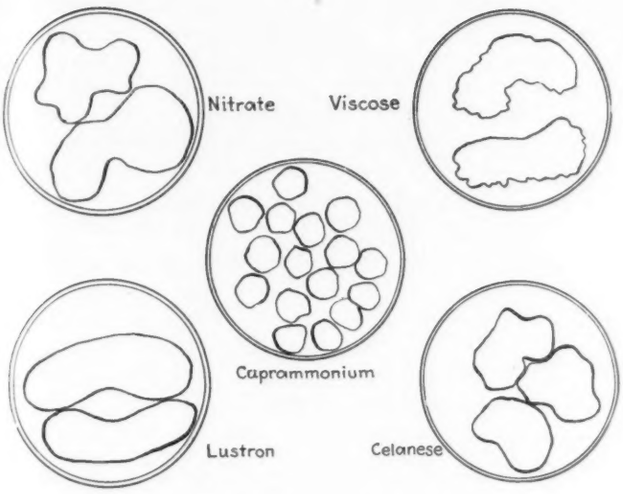
This is not the most convenient form for applying the expression, since a is not measured directly, but instead, the area of a magnified image of the section is determined as A. The relationship between a and A will evidently be

$$a = \frac{A}{M^2}$$

where

M = lineal magnification
a = area of actual section in sq.cm.
A = area of magnified image in sq.cm.

If now we make $M = 1{,}500$, which is a convenient figure for this work, then



Comparative Drawings Made by Tracing in the Projected Section. These may be planimetered readily, or cut out and weighed. Originally each section was from 1 to 2 in. across, but a reduction has been made in reproducing them here.

$$G = \frac{2{,}250{,}000\,D}{900{,}000\,n\,A} = 2.50\ \frac{D}{n\,A}$$

Obviously if the specific gravity (G) of the rayon is known, the denier (D) may be computed from the formula just given if it is transposed to read—

$$D = \frac{n\,A\,G}{2.50} \quad [\text{where } M = 1{,}500]$$

or

$$D = (900{,}000)\ \frac{n\,A\,G}{M^2}$$

for the general case at any magnification.

Herzog gives the following values as approximately correct averages for the specific gravity of the various types of rayon:

Nitrate	1.52-1.56
Cuprammonium	1.52-1.53
Viscose	1.52
Acetate	1.25-1.30
Silk	1.37

If the area is determined directly by computation from the measured dimensions of the section in microns (one micron equals 1/1,000 millimeter), the formula becomes

$$\text{Denier} = .009\ a\ G\ \text{(per filament)}$$

The magnification, of course, does not enter here, since it has already been taken into account when the dimensions of the section were measured.

Quantitative Comparisons

Before leaving the discussion of the shape of the cross-section, mention should be made of a method for comparing the shapes of sections quantatively. Briefly, the actual area of the section is compared with the area of a circle whose diameter is equal to the length of the section. The area may be measured directly by means of the microscope or may be conveniently determined by means of the formula quoted above, when the specific gravity is known. The actual area is this value divided by M^2 and multiplied by 10^7. No serious error will be introduced by assuming the specific gravity to be the average of the figures given for a particular type in the preceding table. The percentage circular area or what we shall term the *"disk coefficient"* is, then—

$$k_d = 100\ \frac{4\ a}{3.14\ d^2}$$

$$= 127\ \frac{a}{d^2}$$

where

k_d = disk coefficient in per cent.
a = the actual section area in square microns.
d = the maximum distance across the section in microns.

The accompanying plot (Fig. 1) shows the variations in disk coefficient (k_d) with the ratio of maximum to minimum dimensions of section (based on Herzog's data). It can be seen at once that while there is a rapid increase in k_d as the ratio of dimensions approaches 1.0, the curve is not a straight line. Thus there is no direct relation between the values. While it would be possible without difficulty to determine the equation of the best curve through the points it is hardly worth while in view of the following considerations.

It will be apparent upon examination of the chart that there are two ratios of very nearly the same value—namely, 1.31 and 1.30—which occur for quite different disk coefficients—39.2 per cent and 60.5 per cent. When the shape of the sections corresponding to these values is noted, the reason for the discrepancy is evident. In the first case, the minimum dimension to be taken is almost indeterminate, unless the average of a number of values at equal intervals across section is chosen. This would yield a value of 2.3, and inspection of the curve of the chart will show that this is much closer to the curve than the original figure of 1.31. The precision of such a method is not great; and since the values of the ratio change at a variable rate, the utility of such an equation for conversion from ratio to disk coefficient and vice versa is doubtful.

A scheme which is better and just as easy is the experimental determination of the values by means of the microscope. The indentations, again, make measurments uncertain.

While it may not be strictly in accord with the main theme of this article, the subject of fabric and yarn sections demands a certain degree of study here. Numerous texts give varied formulas for computing yarn diameters and set of fabrics. It has been the experience of the author that the rational way to attack this question was from the empirical rather than the theoretical standpoint. No amount of speculation nor of mathematical treatment will avail, when the conditions in the fabric are frequently so different from what the assumptions call for.

It is such an easy matter in the light of modern investigations, and with a textile microscope at one's disposal, to determine in a very few minutes what the actual conditions really are[8]. Mathematical treatment at this point, if it is deemed necessary, will be worth something. Fig. 2 shows two sections of viscose satins. It requires no particular stretch of the imagination to see the actual shape of the yarn cross-sections (round in one and flat in the other) and to trace the path of the warp yarn. At sufficiently high resolution and magnification, it is not difficult to estimate the type of rayon employed with at least a fair degree of precision.

Another cross-sectional study which may be made of

(Continued on page 148)

[8]King & Poole—*Journal of the Textile Institute*, March, 1929, p. T47.

Package Dyeing of Rayon Yarns

Its Present Application and the Possibilities for the Future

*By G. T. Metcalf**

FOR the first few years rayon began to command the attention of the industry as a textile fiber, it was the source of serious financial loss because of difficulties in backwinding from skeins after dyeing. This difficulty was probably partly due to the fact that the fiber itself had not been perfected, also because suitable dyes and dyeing methods had not been developed. The skeins had to be kept in the dye bath an undue length of time and agitated to an excessive degree. This inevitably resulted in tangled skeins, which made the skein-spooling cost prohibitive in some cases. The tangled skeins were also a fertile source of shiners and broken filaments, two very familiar stumbling-blocks for manufacturers of rayon fabrics.

Due to these difficulties considerable interest was created in the possibilities of dyeing rayon in the wound form, the principle involved being that if rayon is backwound from skeins before dyeing, instead of after, it will naturally be in better condition; that is, comparatively free from shiners and broken filaments. Furthermore, the skein-spooling cost thus becomes a constant or known factor, instead of a variable or unknown factor, and to that extent puts manufacturing on a more scientific basis.

Package dyeing (or cheese dyeing as it is called in some countries) would, of course, be even more effective if the rayon in the process of manufacturing were never put into the skein form. It would then be wound direct from spinning bobbins, or similar containers, to the dyeing package, eliminating altogether the backwinding of skeins.

Manufacturers Study Dyeing Problems

Due to the interest in wound-form dyeing of rayon, a number of dyeing machinery manufacturers have for years been devoting their attention to the development of a machine for the purpose. The Franklin Process Co. has succeeded in designing a machine that is commercially practical. This company has built package-dyeing machines for the exclusive use of the Franklin Rayon Corporation, in Providence and Boston. This latter company is dyeing at the present time large quantities of rayon in Franklin package form.

As previously suggested, one obstacle to the more rapid development of package-dyeing for rayon yarns, is that the yarn in order to be desulphurized and fully bleached is put in the skein form anyway. This being the case the natural thing is to dye the yarn in the skein, provided the rewinding operation is not too costly. Furthermore, it is true that hand in hand with the increased use of rayon have come improved methods of manufacture, improved dyestuffs that are better suited to the fiber, and improved skein-dyeing methods. These improvements have undoubtedly made the dyeing of rayon yarns in the skein form much less of a problem than it was five years ago.

However, the dyeing of deniers finer than 150 still presents a problem, particularly when the type of color desired requires an extra long time in the dye bath. In fact the more lengthy dyeing process presents a problem even on the coarser deniers. There has for some time been an increased interest in the textile industry in the finer deniers and multi-filament yarns. This tendency has in turn created new interest in package-dyeing.

Successful on Fine Denier Yarns

New England mills that have been using rayon for years, not long ago accepted contracts for fabrics invoving the use of multi-filament colored yarns. These yarns were dyed and it was so difficult and so costly to wind them after dyeing that the attempt was finally abandoned and the yarns were sold for waste. New lots of yarn were then dyed by the package method and the results were satisfactory. Package-dyeing has also received considerable impetus of late in connection with the development of yarn dyed tricot and milanese rayon fabrics. Package-dyeing is used in this connection for the application of colors fast to cross-dyeing, over-dyeing or bleaching. Yarns as fine as 35 denier are regularly dyed with Indanthrene colors by this method and even 15 denier yarn has on several occasions been successfully processed.

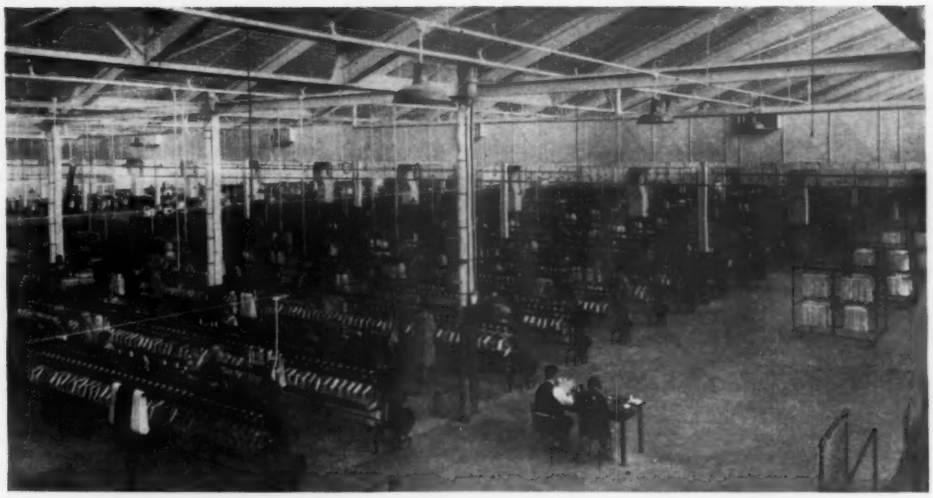
There also appears to be a definite but more limited field for package-dyeing in connection with the use of coarser denier rayons, such as 150 and 300. For instance, narrow fabric mills making satin-face rayon fabrics (called "honeycomb web") or suspender fabrics, where there are long floats of filling of the same shade adjacent to each other, sometimes have as high as 50 per cent seconds due to streaky colors. Some mills making such fabrics have resorted to package-dyeing to remove this streakiness and by so doing have reduced their seconds to a nominal minimum.

Some of the most successful lingerie braid manufacturers who are using 150 denier also prefer package-dyeing. One of the difficulties experienced by these manufacturers is that broken filaments "bunch up" at the pot eye on the braiding machine, collect oil and make a dirty zigzag streak in the braid. Package-dyeing, they claim, by reducing the number of broken filaments, also reduces this difficulty. Some manufacturers of corset and brassiere fabrics have also found, after exhaustive tests, that package-dyeing produces more even shades.

The textile industry has recently been seriously censured in the trade press because of the too prevalent use of inferior rayon. It is not the purpose of this article to encourage the use of inferior yarns, but it is a fact that there is less risk in using such yarns if they are dyed by the package method. It is perhaps needless to point out the reason for this: namely, that the yarns are skein spooled before dyeing instead of after. When such yarns are dyed by the package method, imperfections that they may have are not aggravated by the dyeing operation. In the wire trade manufacturers report that rayon dyed by the package method gives less trouble.

The success of package-dyeing for cotton and worsted yarns is today a universally recognized fact. Whether package-dyeing for rayon yarns will ever assume the same degree of importance depends largely upon the development of some method for washing and bleaching rayons in the wound form. Even if this never comes to pass, recent tendencies in the use and manufacture of rayon yarns, as outlined above, seem to assure package-dyeing a place of considerable importance in the industry.

*Franklin Rayon Corp.



View in Winding Department of American Bemberg Plant

More Knowledge Needed on Reactions of Synthetic Fibers

*By A. M. Tenney**

STYLE today is without doubt most important in the promotion of high-grade fabrics. Style is admittedly an exacting and hard taskmaster. However, when one studies and appreciates the demands and interprets them into terms of yarn, constructions, and finishes, style may be made an active and valuable ally.

To properly do this the manufacturer and finisher of fabrics must take into consideration the inherent qualities of the fiber and yarn to be used. The different values and their resulting effects in cotton, silk and linen fibers are well known through centuries of use and experience. But are the inherent values of the various synthetic yarns either well known, or their reactions to various treatments used in the manufacturing processes understood? Results during the last decade indicate rather clearly that they are not.

Properties of Bemberg

A study of the yarn of chemical origin manufactured by the American Bemberg Corp. from cotton linters by the cuprammonium method, brings to light certain outstanding fundamental properties, each of which has a very definite place in the manufacturing and finishing of any fabric designed to meet certain style demands. Briefly, these fundamental properties are:

(*a*) High strength, wet and dry.
(*b*) A natural subdued luster.
(*c*) An unusual number of fine filaments in each denier size of yarn; (for example, 150 denier Bemberg contains 112 filaments).
(*d*) The finest denier synthetic yarn produced commercially. (Equivalent to 14/16 denier and 24/26 denier raw silk, with filaments finer than silk.)
(*e*) Manufactured from cotton linters by the cuprammonium method, and using the exclusive stretch-spinning process, producing a very even yarn.

In order to make the most of synthetic yarn properties, the different values and their resulting effects should be well known. To further this result, American Bemberg Corp. maintains a laboratory and a staff of technical men to assist manufacturers and finishers. Style as well as technical properties is under the microscope.

Results Already Obtained

This article cannot go exhaustively into the effect of these inherent qualities on manufacturing and finishing processes, but will try and point out certain established results already secured. These results are based on reports from manufacturers, finishers and testing laboratories on the one hand, and the surveys conducted among teachers of textiles, consumer groups and store buyers on the other hand.

Wider Range of Fabrics

The fineness of filament and range of deniers (15 to 300 deniers now available) make possible a wider range of fabric constructions, thus providing the means to produce the resulting fabric desired. These requirements may be exacting as to "hand," draping

*American Bemberg Corp., New York.

qualities, weight, etc. Furthermore, the wide range of deniers and availability of fine denier yarn make possible effective combination yarns combining with silk or wool.

The high strength makes the handling in preparation of yarn, and manufacturing of fabric, easier under the varying conditions of humidity or moisture encountered during manufacturing, finishing, and in wearing and subsequent launderings. High strength in the basic spinning material results in the production of the finest yarns and filaments, and provides the means to lighter and sheerer fabrics, such as voiles, ninons, chiffon and georgette crepe constructions.

A natural low luster should imply to the manufacturer a yarn containing all its inherent original strength, and the permanent low luster so definitely demanded in certain fabrics. In addition, however, by the proper design and construction of the fabric, one can secure a higher luster when wanted.

In finishing, as in no other place, the inherent characteristics must be given careful consideration. The action of the fabric in the handling, in the taking of the dye, in the resulting color effect; in fact, in every step the number of filaments, the uniformity of the yarn, and the chemical characteristics have a definite effect.

Results indicate that when Bemberg yarn is the basis of the fabric being finished, any of the several standard methods of fabric dyeing can be used. However, the affinity for and the rate of taking the dye will be different; the fabric may be less disturbed by temperature and dye solutions; but the dyeing from piece to piece should be more uniform, and a better control of the dye in a mixed fabric can be secured when a toning effect is desired. Although perhaps all the reasons for these results are not known, the large number of uniform filaments, making available a greater surface exposed to the dyes, have much to do with it.

Laboratory and Technical Staff

Realizing the important part played in the finished product by these qualities, and realizing the results possible when these qualities are used to their best advantage, the American Bemberg Corp. has established and maintains a laboratory and a staff of technical men in New York to assist the manufacturer and finisher. Here the result desired is analyzed; calculations and experiments are made which in turn form the basis of suggestions to any manufacturer, either contemplating or using this yarn, who may desire to take advantage of this service. Only by taking advantage of each characteristic in the yarn can fabrics be produced that will best meet the demands of the mode at a minimum cost of manufacture.

The synthetic fiber industry is one in which scientific problems assume primary importance, the technical solution of these problems being the measure of progress. Today, style as well as yarn is under the laboratory microscope.

New Canadian Rayon Plant Rumored

HALIFAX, N. S.—Rumor is current that Stanfields, Ltd., are about to establish a plant for the manufacture of rayon from sulphite pulp in Queen's County. It was announced that the company would enter this branch of operations, but as yet no definite steps have been made. The company has confined its operations in the past to the manufacture of underwear and even in the most trying times in the industry, it has managed to maintain a strong liquid position.

Finishing Rayon Knit Goods

Dyeing and Bleaching Do Not Present Difficulties of Former Years

DIFFICULTIES in the processing of the various rayons in the knitting trade are partly mechanical and partly chemical and physical. The mechanical difficulties may be further subdivided into manipulation and penetration problems; the manipulation problems arising from the fact that rayon will not withstand the handling that might be given to cotton. It should never be forgotten that rayon is considerably weaker than cotton and has greater elasticity when wet than when dry.

Uneven strains throughout the fabric, either before or after dyeing, causes such defects as are commonly known as "shiners" and streaky work from lack of uniformity in the absorption of the dyestuff. Friction in the dyeing of yarn or material made of rayon causes hairiness, which gives considerable trouble in rewinding and knitting; also in the goods a very poor appearance results.

Progress in Machinery

The dyeing equipment firms have made great progress in the machines now used for dyeing or bleaching rayon, and there should be no reason why a dyer, by the use of a certain amount of discretion, should experience any of the difficulties attributed to strain or friction. It should be borne in mind that in the dyeing, bleaching, or finishing of rayon yarn or knit goods, the shortest possible procedure and recipes must be selected, as the longer the operation, the greater is the chance of fuzziness and strain defects in the fabric or garment.

Rayon yarn and knit goods cannot be wrung out like cotton after processing. The yarn before hydro-extracting must be wrapped in cloths and it is also very good policy to wrap each piece of rayon knit goods in cloth before extracting. This will prevent creases or friction marks which are very difficult to remove when once formed. In the drying of rayon, this fiber again shows its greater sensitiveness than cotton.

The effects produced by the action of heat on rayon are extraordinary. A too high heat causes the rayon to become harsh and brittle, and this condition is not overcome entirely by conditioning. Wherever possible, in drying this class of material, the temparature should not exceed 130 degrees F., and the material should not be subjected even to this low temperature any longer than is necessary for its thorough drying.

Soft water should always be used for dyeing rayon and the addition of some of the new oils made especially for use with rayon will minimize the danger of friction. The beginner should experiment to determine how they work under the conditions at his mill. The recent practice of treating rayon with metallic salts for various purposes, such as to impart a greater affinity for certain dyes, and for delustering, causes the formation of insoluble sticky metallic compounds. Even today this is the cause of considerable trouble and loss to the manufacturers who attempt to remedy all evils in the dyehouse with soap. Amnog some of the defects attributed to this metallic soap deposited on the fiber or fabric are rancid odors, stains, uneven dyeing, as well as a dingy appearing fabric.

All in all, the problems in the processing of rayon and

celanese in the knit-goods trade have been reduced to a minimum, and the dyeing or bleaching of these fibers is no longer looked upon with fear by the dyer and bleacher, as in former years. Practically all difficulties found in the mills today are due to local conditions which can be easily eliminated if gone after in the proper spirit.

Of late the trend in rayon tubular knitted fabrics has been for low-luster finish. The rayon manufacturers are able to produce yarn without the high luster, thereby relieving the dyer of the responsibility of trying to deluster rayon yarn himself. In most cases the delustering of yarn by the dyer has not been very successful, at the same time entailing expense and time for the operation.

Barre Effects Eliminated

One of the greatest improvements in rayon knit goods is the elimination of barre effects, which were so prevalent a few years ago. Due to the research work that has been carried out by the rayon manufacturers on this problem, we now encounter very little trouble with barre goods. They have not entirely disappeared, but it is only a question of a short time when the difficulty will be overcome.

The demand today is for fast colors, and it behooves the dyer to be very careful in selecting colors that will meet with the approval of the public. The most important requirement for rayon knit goods is washing fastness. There are dyestuffs available on the market today that are reasonably fast enough for this type of fabric. Two classes of dyestuffs, namely, the direct cotton and developed colors, are largely used for dyeing rayon knit goods. For light shades there are colors of the direct dyeing type that have very good washing properties, and for medium and heavy shades the developed colors are suitable.

Dyeing Suggestions

The manufacturer or dyer who is interested in improving the quality of his goods should consult with the dyestuff concerns and obtain the necessary information relative to the selection of dyestuffs needed for his purposes. We had the opportunity of seeing a garment that had been trimmed in black, before and after it was washed. After washing, the garment was ruined, as far as color was concerned. The material that had been dyed black did not stand the washing, and stained the rest of the garment. If the dyer had had sufficient knowledge as to fastness requirements, and was familiar with the properties of his dyes, he could easily have produced a faster black, by aftertreating his direct black with acetic acid and formaldehyde, or by using a developed black.

Rayon knit goods, as it comes to the dyer, varies in width from 17 in. up to 26 in., and runs from about 80 to 90 yd. long. If it is possible, it is a good plan to run all the same width pieces of about the same length together in the dye kettle. Goods as they come from the knitting frames must be freed from the conditioning oils that have been used during the knitting operation. In the majority of cases these oils are easily removed by rinsing the material in warm water in the dye kettle. If it is found that the material is not clean after this operation, the cloth can be given a light scour with 1% of neutral soap on the weight of the goods, or special detergent preparations used. The soap can be dissolved in a clean half-barrel, or several pails, and added to the kettle, and goods run for 20 min. at 130 degrees F., and then washed thoroughly.

The application of the direct colors is carried out under comparatively simple methods for women's undergarments. The shades as a rule are very light. The dyebath is made up wtih the required amount of color and run at a temperature of about 120 degrees F. The actual time required for dying the light shades is comparatively short. Generally, one-half hour is long enough to arrive at the shades. For most shades, the addition of salt is not necessary, but in cases where it is needed, 5% of glaubersalt will be sufficient to assist the dyestuffs on to the material.

Application of Developed Colors

The procedure for the application of developed colors requires closer attention of the dyer. As we have already said, these colors are preferred for medium and heavy shades on account of their additional fastness properties over the direct color types. The required amounts of dyestuffs and glaubersalt, or common salt, are added to the dyebath at 120 degrees F., material is brought up to 160 to 180 degrees F. in one-half hour, and continued at that temperature for one hour, after which a sample is taken and the goods washed off until cold, so that they may be further aftertreated to develop the shade. The sample taken at this time should be kept as a reference for future lots of the same shade.

In order to arrive at the true shade dyed with developed colors and obtain the maximum fastness, it is necessary to aftertreat. This is commonly known as diazotizing and developing. The material is run cold for 15 min. with 3% sodium nitrate and 5% sulphuric acid, based on the weight of the cloth. The sodium nitrate is dissolved separately, added to the kettle, and material thoroughly saturated before adding the sulphuric acid, well diluted. Five minutes is sufficient before adding the acid. After the material has run 15 min., it is washed thoroughly with cold water until all trace of the diazotizing solution is removed; usually 30 to 45 min. is required in washing off. The developing bath is made up, generally using 1% beta-naphthol and ½% caustic soda, based on the weight of the material. The beta-naphthol and caustic are dissolved together by the use of hot water; boil if necessary. This is added to the kettle and the material run for 15 min. cold; then washed off thoroughly. After this operation, the true shade is obtained and the goods can be removed from the kettle.

To Gain a Soft Feel

If it is desired to add a soft feel to the fabric in either of the methods of dyeing, this can be accomplished by rinsing the goods in a weak soap bath; the writer prefers olive oil fig soap for this operation. The goods are run for 5 to 10 min. in the soap solution and removed without washing, extracted, and made ready for the dryers. Upright dryers are used with spreaders, according to the width of cloth desired. In general, it has been found that by drying rayon knit goods at a moderate temperature, more satisfactory results are obtained than by drying at high temperatures—at the same time effecting a saving in coal. It is well to repeat this. After drying, the goods are passed through the calender and given a further steaming to improve the feel of the fabric. It is not necessary to pass the goods over hot calender rolls; excellent results are obtained by runnnig the goods through with just the heat absorbed from the steaming.

Rayon Convalesces

(Continued from page 88)

which have obtained in the past. Up-to-date producers are leaving no stone unturned to cut the factory costs to meet present conditions.

"The great problem of cheapening fabric constructions goes on merrily all the time and, as far as I can see, with no good to any one concerned. The matter has been discussed many times by some of the leading factors in the industry, but no sound solution has ever been proposed. This matter, of course, is very closely concerned with the question of substandard or inferior yarns produced by the various companies and, from my point of view, it is difficult to see how the matter is going to be settled. One suggestion that has come to my attention is to have all companies agree to destroy or turn all the inferiors into waste, but this is not economically sound and is only a case of the wish being father of the thought. Inferiors and substandards will continue to be used by the trades which can use them to advantage.

"With the Glanzstoff-Enka merger abroad, the field of independent producers is narrowed down and it is well within the realm of probability that other consolidations will take place during the coming months.

"Generally speaking, the future outlook is excellent and if the producers and consumers hew to the line and follow sound policies, prospects are excellent for 1930."

* * *

Martin Coles Harman, founder of the Branston Artificial Silk Co., Ltd., and chairman of John Hetherington & Sons, Ltd., textile machinists, England: "The Artificial Silk Industry in Great Britain has arrived at that most interesting stage when on the one hand virtually all the companies which are not strong enough to stand have been eliminated, whereas on the other hand those which are destined to succeed have acquired in the stern school of experience the requisite knowledge to bring success within their grasp.

"Among this second class there is a mutual understanding and goodwill, born of the difficulties of the last 12 months which is in striking contrast to the atmosphere of mutual disparagement and suspicion which was so noteworthy a year ago.

"The industry is now ripe for a great forward move. The signal has been given by the cotton strike. Just as the coal strike gave a tremendous impetus to various patent fuel and fuel economising businesses, and the railway strike gave a tremendous impetus to road transport, so the cotton strike is bound, in my view, to give a tremendous impetus to the artificial silk business. But in the great growth which is now to be foreseen there will be room only for the strong. We have heard the last, I think, of new companies formed to exploit new ideas. New ideas will in future be tried out by established companies who can pay for such trials out of their profits.

"The investor will invest his money in the shares of the companies which have stood the test of time.

"The industry is developing not as the cotton industry did by the formation of numerous individual units, but by comparatively few large businesses which will provide the large amount of artificial silk fibres which will be required in this country. These comparatively few businesses will be able to give good service to their customers, good wages to their employes, and good dividends to their shareholders.

"When we come to look back on 1928-29 after the space of five years, we shall, I think, see not only that the industry has made most phenomenal progress, but that the prosperity of those serious companies which are already known to insiders as being destined to succeed, dates from the difficult period from which the industry is now emerging, and has its source in the necessity which has been imposed upon everyone of facing realities in the vital matters of quality of the product and production costs."

* * *

Sir Edwin Stockton, Chairman of British Breda Silk Ltd.: "I have great confidence in the future prospects of the artificial silk industry. It has made rapid strides during the last few years, and there is every evidence of further progress in the immediate future. The markets of the world are beginning to realize the value of this new fiber, and it is being used in a variety of ways with valuable effect.

"In my view, we have as yet, only touched the fringe of its potentialities, and I venture to believe that Great Britain will continue to make great progress in the development of this important industry."

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Sir William Bulmer, managing director of the British Acetate Silk Corp., Ltd.: "The stability of the price of rayon, which has contributed so much to the use of rayon with the manufacturing and consuming classes, is now being sacrificed to the momentary exigences of the position of certain firms. This is greatly to be deplored. Competition should be rather in quality and manufacturing methods than in price cutting.

"Internal internecine competition can only result in permanent instability of the whole fabric of the rayon industry, from the raw material to the finished garment, thus adding to the utter confusion and uncertain prices such as obtain in the older textile trades.

"Only by organization of the industry on the foregoing lines can the prosperity of the industry and the popularity of rayon continue."

Microscopical Examination

(Continued from page 143)

rayon is quite well known, but as yet sufficient use is not made of it. This is the examination of the cross-section with a view to revealing the degree of dye penetration, the fading action of sunlight on an exposed surface, etc. Of course the coating with solutions of the various rayon bases, applied to various types of yarn or fabric, may also be well shown.

Filament cross-sections have been only infrequently investigated by means of polarized light. It has already been pointed out in the preceding paragraphs that it is difficult and sometimes impossible to distinguish between nitrate and acetate by the shape of the section alone. The familiar burning test can be used, but where the filaments occur together in the same material—which is increasingly likely to happen in the future—this may not be satisfactory. Certainly the differentation between certain forms of viscose and cuprammonium is still a matter of some difficulty.

Under polarized light, the different types of rayon in cross-section show the differences in refractive index which exist. Thus the acetates with an average index of 1.48 appear very distinctly in a balsam mount. The nitrate with a higher index (1.54 or more) is nearly invisible. Color change in the section in the form of irregular bands or patches is found in the nitrate and not in the other types. Distinction between vicose and cuprammonium under polarized light is more a matter of longitudinal than of cross-sectional appearance. Aside from these considerations, much may be learned as to the submicroscopic structure of rayon by an investigation of the cross-sections by polarized light using a modified petrographical microscope. This is a subject which is, as yet, practically untouched.

There can be no doubt after consideration of the simplicity and rapidity of the technique involved in sectioning rayon, that there is a method of attack on many of the important problems of the industry. It is increasingly apparent that we have to deal with a microscopic material, and that microscopic methods of study must be better understood and utilized. In no instance is this of more importance, or, on the whole, productive of better results than in the examination of rayon cross-sections.